Innovative Demand Models for Telecommunications Services

FINAL TECHNICAL REPORT
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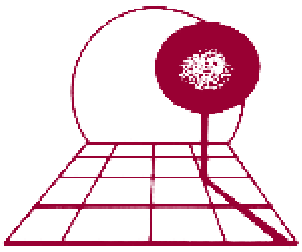

Gamos Ltd.

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Executive Summary

1.1 Introduction

One of the key issues in promoting access for telephony and internet in Africa is the need for information about how new services are likely to be used by consumers - both citizens and small businesses. Regulators, telecoms operating companies and internet service providers (ISPs) all need to predict how quickly and extensively services are likely to develop if they are to establish viable access targets and network or service delivery schedules.

Whilst some companies conduct their own market research, regulators and others have limited resources and expertise with which to generate this type of information. The research aimed to help address the dearth of information by:

- identifying the patterns of use of telephony, particularly public access telephony, in low-income communities in three African countries;
- assessing the implications of these research findings for major stakeholders in the national ICT sectors studied;
- and presenting recommendations to governments, businesses and development agencies concerned with the promotion of access to telephony in similar low-income countries elsewhere in Africa and in other continents.

The research[1] used a two stage field survey process which was guided by initial roundtables in each of three countries (Botswana, Ghana and Uganda) which provided opportunity for presentations on national telecommunications contexts and for discussion between stakeholders on their perceptions of the national market and their priority issues for research. The first stage of the field survey process comprised key informant interviews (with community leaders and local service providers) and focus group discussions with residents in communities representative of those to be researched. The questionnaires used for household interviews in the second stage were designed on the basis of this information. It was proposed that the instrument include a section based on the principles of the Theory of Reasoned Action (TORA) as a means of capturing perceptions influencing use of services.

The research was co-ordinated by Gamos Ltd, in partnership with the Commonwealth Telecommunications Organisation (CTO) and each of the three national telecommunications regulatory authorities – the Botswana Telecommunications Authority, the National Communications Authority of Ghana, and the Uganda Communications Commission. National academic institutions in each country managed field research activities and contributed extensively to research design and analysis - the Universities of Botswana, Legon (Ghana) and Makerere (Uganda).

1.2 Sampling

A sample of 520 to 630 respondents was surveyed in each of the three countries; samples were divided between three different geographic areas, covering urban and rural zones. Within each sampled area, rural and urban geographic survey clusters were selected to reflect a representative rural:urban population split of 70%:30%. Within each cluster, households were selected randomly.

[1] The research was funded by the UK Department for International Development (DFID) under their Knowledge and Research programme (R8069)

In addition, the sampling was designed to include four types of pre-defined service coverage areas:

- a High Access Area, i.e. a geographic zone within the sampled areas that had access to a fixed telecommunications network and to two or more mobile telecommunications networks;
- a Medium Access Area, i.e. a geographic zone within the sampled areas that had access to a fixed telecommunications network and to one mobile telecommunications network.
- a Low Access Area, i.e. a geographic zone within the sampled areas that had access only to a fixed telecommunications network;
- and a No Access Area, i.e. a geographic zone within the sampled areas that has no access to any telecommunications network.

This methodology was varied in the case of Uganda to include an area of the capital city, Kampala. This was necessary, in a country whose telecoms market is overwhelmingly based on GSM technology, in order to provide data for analysis of internet use, and because the typology based on fixed telecommunications networks was not applicable – a distinction between rural and urban communities was made instead.

Although tailored to match the national telecommunications context, the questionnaires in all three countries comprised the same three sections:

- descriptors, e.g. age, gender, occupation etc.;
- market variables, to describe existing patterns of usage, e.g. frequency of use;
- attitudes and intentions regarding a range of issues.

1.3 Findings from Data

1.3.1 Research countries: national market characteristics

The three research countries were chosen because, although all had experienced substantial restructuring of their telecommunications markets, they had undertaken restructuring in significantly different ways - in Botswana, through a single fixed network operator and competing mobile operators (two operators); in Ghana, through strategic external investment in the incumbent fixed operator and the introduction of new fixed and, more substantially, mobile networks; and in Uganda through the award of a second national operator licence to a company providing access through GSM wireless technology.

Botswana is a relatively high-income developing country in Southern Africa; it has a low population density with many communities dispersed in arid rural areas which pose substantial network roll-out problems for both fixed and mobile telecommunications operators. Ghana, in West Africa, and Uganda in East Africa are much poorer countries. Population density in Uganda is relatively high in most of the country, while some remote areas currently suffer from significant problems of insecurity. At 33%, teledensity in Botswana is an order of magnitude higher than in Ghana and Uganda – 3.5% and 2.3% respectively.

The following table summarises the individual teledensity level (i.e. number of telephones per 100 population) in each of the three study countries.

	Botswana	***Ghana***	***Uganda***
Population (millions)	1.7 (2001)	21 (2001)	23 (2001)
Per capita GDP (PPP$)[2]	7,184 (2000)	1964 (2000)	1208 (2000)
teledensity	33% (2002)	3.7% (2002)	2.3% (2002)
Mobile phones per 100 inhabitants	24.2 (2002)	2.21 (2002)	2.01 (2002)
Fixed line phones per 100 inhabitants	9.1 (2002)	1.51 (2002)	0.26 (2002)
Payphones per 1,000 population	1.28 (2000)	0.16 (2000)	0.06 (2000)
Internet user per 100 population	0.74 (2000)	0.15 (2000)	0.18 (2000)

1.3.2 Choices available to customers

Customers generally have a choice not only of telephone technology to use (fixed line phones or mobile phones), but also of point of access. In most countries the points of access are restricted to public phone booths or commercial providers (private telephone shops), and this is especially true of rural areas. It was evident that a significant number of people in all countries have access to personal mobile phones at home (32% in Uganda[3], 37% in Botswana and 7% in Ghana). These choices are illustrated in Figure 1, where individuals includes home mobiles.

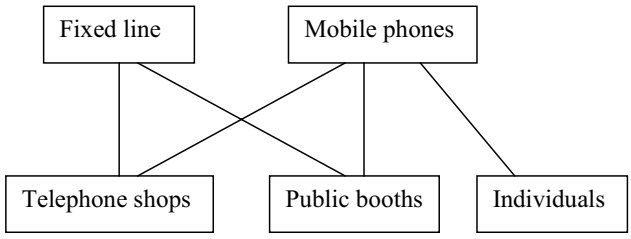

Figure 1 Types of phone, and means of public access

1.3.3 Use of Telecommunications Services

Findings showed that a surprisingly high proportion of respondents made 'regular' use of **telephony** (defined as use within the last three months). It is interesting to note that the proportion of respondents in remote rural areas[4] who make regular use of services is only marginally smaller – 76% compared with 82%. This indicates that people are either prepared to make the effort (incurring costs and time) to travel in order to access services and/or take the opportunity to use the telephone when away from home. Individual country results show relatively little variation around these average figures, suggesting that these are likely to be robust across a range of national economic and telecommunications environments.

These figures hide the relative usage of **fixed** and **mobile** phones. Ghana has the highest usage of fixed line telephones, while Uganda has the highest usage of mobile telephones. This reflects both availability (e.g. the fixed network is the junior partner in

[2] Human Development Report 2002. GDP per capita (PPP US$) data used in calculating the HDI are based on purchasing power parity (PPP) rates of exchange.
[3] This is artificially high as the sample includes Kampala; however, the figure for the two rural districts is still high at 24%.
[4] Defined as rural sub-counties in Uganda, and areas with no access to any networks in Botswana and Ghana.

telecommunications supply in Uganda) and affordability (e.g. more people can afford personal mobiles in relatively wealthy Botswana).

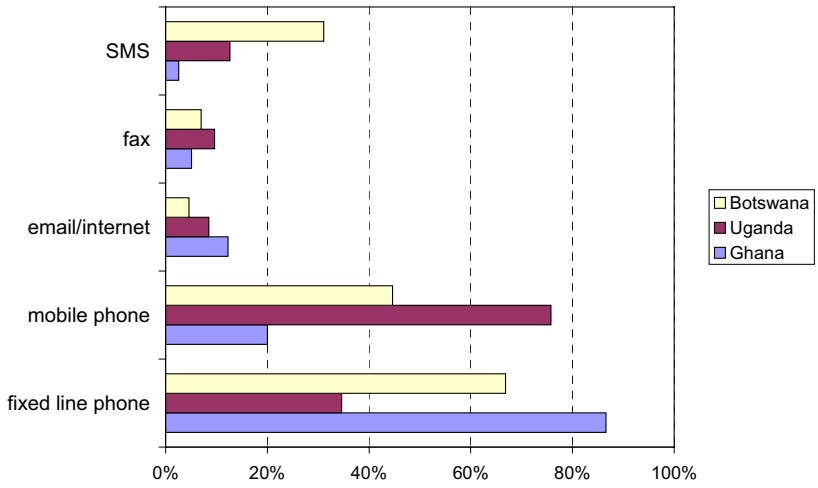

Figure 2 Use of telecommunications services (% of respondents)[5]

SMS use is lowest in Ghana, where fixed line telephony is dominant; it is interesting to note that although mobile use is highest in Uganda, the use of SMS is highest in Botswana, and this probably reflects a more sophisticated customer base. The principal use of SMS is for communicating with friends and family, followed by business use. Some people access SMS services using internet based services. Data confirms the value of SMS as a low cost means of communication; for example, most users in Ghana pay less than 25 cents to send a message, whilst the mode for fixed line calls is 44 cents (range 25 – 62 cents), and for mobile calls is 94 cents (range 62 – 125 cents).

Although an established technology, **fax** usage is low. Anecdotal evidence indicates that reliability is low, and there are few places that offer the service. Business use of fax is high, on a par with social matters, and there is a relatively broad spread of costs incurred in sending faxes.

In contrast to the widespread regular use of telephones, the research revealed low levels of **email and internet** (browsing) use in all three countries, even in areas of high service coverage. On average across the three countries, less than 10% of respondents claimed to use email services or browse the internet on a regular basis. Usage is highest in Ghana and lowest in Botswana[6].

The survey concentrated on gathering data on the dominant features of communication, that is phones, points of public access, and email and internet, and the report presents a summary of analysis carried out on these. Further data on other communication services is presented in supporting project documents. For each of the principal services, information is presented on various characteristics of **patterns of use**, including:

- Intensity of use – how frequently people use services
- What time of day people access services;

[5] Fixed / mobile breakdown estimated for total Uganda sample including Kampala; based on combined sample for Botswana.
[6] The figures for Uganda are not directly comparable as the survey includes a sample from the capital city of Kampala.

- Principal means of public access e.g. booths, teleshops, individuals with private handsets;
- Purpose of calls – what types of communication people use services for;
- Destination of calls – where people are making calls to;
- Duration of calls – both made and received;

In addition to patterns of use, the report presents a discussion of features that appear to act as **drivers and barriers** to use of telephony, i.e. the positive factors encouraging them to make use of telephony and the negative factors which discourage them from doing so. Some of these factors relate to telephony in general (including private lines) but most are concerned with drivers and barriers to use of public access facilities.

1.4 Implications of Findings

The principal finding of the research is that between 75% and 80% of respondents in researched areas use telephony on a 'regular' basis (use within three months), and that the proportion of those living in unserved areas adjacent to areas with service who make regular use of telephony is only marginally lower (at 70% to 75%). These figures appear robust across the different telecoms environments and income levels experienced in the three study countries. It implies that regulators and telecommunications businesses should assume that the substantial majority of adults in most African countries will wish to make significant ('regular') use of telephony, i.e. to use a telephone once a month or more, and should build their maximum subsidy projections and network revenue return projections on this level of usage.

Furthermore, evidence indicates there is considerable scope to increase usage of telecommunications services and certain means of access. Analysis shows the following trends:

- the potential growth in use of mobile phones. Figures from Botswana and Ghana indicate that whilst intention to use fixed line phones is roughly in line with current use, intention to use mobile phones is 20 – 30% higher than current use.
- This desire to use mobile phones is also evident in the intended choice of access points in all three countries; whilst potential changes in use of booths and telephone shops is modest, intention to use private phones (mobile, by implication) is 20 – 40% higher than current use.
- the trend in Ghana and Uganda is away from telephone shops, in preference of booths. This is in contrast to Botswana, where the trend appears to be in favour of telephone shops, at the expense of booths (note that negative attitudes for booths were strongly held, notably that they are often out of service).
- It is noteworthy that interest in the internet is higher than in email, even though current email use is higher.

Groups indicating a stronger increase in user of services were:

- those currently not using the corresponding ICTs;
- those with no or little formal education (in Ghana and Uganda, but not Botswana);
- those residing in No Access Areas,
- and those residing in Rural Areas.

Analysis suggests that there is least scope to increase use amongst those groups who are most likely to have already integrated the optimal level of telephone usage into their lifestyles:

- those with higher levels of education;
- those aged between 25 and 40.

1.5 Summary of Recommendations

1.5.1 Policy Makers

- Universal access strategies should be based on a thorough understanding of low-income markets.
- The substantial majority of adults in most African countries will make significant ('regular') use of telephony, policy makers should build their projections on this level of usage.
- Regulators should establish guidelines for determining those areas in which access cannot be provided on a commercial basis, to ensure that universal access funding is only provided in those areas where subsidy is genuinely needed.
- License arrangements should not constrain the means of access suited to remote areas e.g. take account of preference for access through private providers rather than through booths.
- Stimulation of competition between suppliers of public access; create a mix of public access points (booths, teleshops, individuals).
- Consider Preferential tariffs to compensate for the overheads that need to be charged on services from teleshops. Explore the introduction of a wider range of tariff packages designed to increase ownership.
- Minimise cost penalty for off network calls. Differential charging for termination of traffic on other operators' networks acts as a barrier to use.
- Regulators should monitor the performance of telecommunications network businesses in responding to user requirements and stimulating demand.
- Regulators should require network operators to undertake regular quality of service monitoring.
- consider undertaking further research studies of, for example:
  - consumer responsiveness to different tariff strategies;
  - individual customer expenditure patterns on communications;
  - the impact of telephony access on postal services and on remittance transfers;
  - and training requirements to promote effective use of email and internet.
- Assess the relative merits of prioritising network expansion for telephony, or internet facilities.
- promote internet access and use by considering a number of measures to help overcome barriers associated with high cost and unreliability:
- Improve quality and availability of power supplies e.g. through coordinated network development initiatives.

1.5.2 Operating Companies

- Revise network expansion strategies based on higher assumptions about the revenue that can be derived from low-income markets.
- Improve network quality of service - pre-empt regulatory action to raise standards
- Promotional / educational activities e.g. campaign or road show, especially targeting low use groups.
- Encourage high users of public access facilities to upgrade to personal phone ownership.

- Segment the 'small user' market and address different groups within that market in different ways, and devise strategies to overcome barriers to each.
- Be prepared to meet high levels of demand in newly served areas.
- Provide information and support for new users not familiar with the technology.
- Email and internet is likely to remain a niche market until cost and reliability can be improved.
- Ensure means of public access does not constrain use; operators should determine the type of facilities which most effectively meet consumer needs.
- Operators may find it financially beneficial to provide support to public access providers e.g. bulk discounts, micro-finance, business skills training.
- Take account of consumer concerns when designing operator managed public access facilities.
- Attended service overcomes barriers to use amongst users in newly-served areas.
- Introduce initiatives to address concerns over pricing levels and methods of charging.
- Facilitate incoming calls to rural areas e.g. operators may find it beneficial to find means of sharing reverse traffic revenue generated by 'beeping' with teleshop operators in order to give the latter an incentive to facilitate 'beeping' calls by their customers.

1.5.3 Development Agencies

- Development agencies need not be directly involved in investment in infrastructure. Levels of demand for basic voice telephony usage should be sufficient to attract private investment.
- Facilitate the sharing of experience between African policymakers and regulators - there is an increasing volume of regionally experience in the implementation of competitive markets and the establishment of universal access strategies in Africa.
- Specific support to address barriers identified e.g. promote network availability, promote local access methodologies (such as entrepreneurial teleshops), support the establishment of universal access schemes.
- Research into impact of ICTs on rural livelihoods, to help prioritise investment in basic services (such as voice telephony) and internet.
- Support coordinated infrastructure investment approaches bringing power and communications services together.
- Conduct further research into the impact of telephony access on mainstream development objectives including livelihoods and poverty reduction.

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This report has been compiled using supporting material supplied by:

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Contents

2 Introduction

2.1 Background

This document is the final technical report of a research study of *Innovative Demand Models for Telecommunications Services* undertaken in three African countries (Botswana, Ghana and Uganda) in the period from October 2001 to June 2003. The research was funded under the Information and Communication Technology theme of the Knowledge and Research (KaR) programme run by the Infrastructure and Urban Development Department of the UK Department for International Development (DFID). This is intended to support detailed and innovative research focused on the relationship between infrastructure development and poverty reduction. The research was coordinated by Gamos Ltd in partnership with the CTO (Commonwealth Telecommunications Organisation), and the national telecommunications regulatory authorities of the three countries where field research was carried out - the Botswana Telecommunications Authority, the National Communications Authority of Ghana, and the Uganda Communications Commission. Field research was undertaken with support from academic institutions in each country - the Universities of Botswana, Legon (Ghana) and Makerere (Uganda), which managed field research activities in their countries and contributed extensively to research design and analysis.

The research overview for the project identified the core issue for investigation as follows:

> *Developing countries are increasingly relying on commercial practices to provide the telecoms infrastructure needed for access to telephony and internet. Strategies to promote this investment include the commercialisation and privatisation of parastatal telcos, supported by independent regulation. Governments, regulators and telcos are hampered by lack of understanding of demand, particularly in rural and low-income communities, and investment decisions tend to be based on incomplete market information, leading to sub-optimal provision of services to these areas. This inhibits the most effective infrastructure development and reduces the value of investment to disadvantaged groups and regions.*
>
> *However, examples of innovative approaches to service provision exist, and there is a need to learn the lessons from recent practice and to replicate innovative models where appropriate. Novel methods of service provision mean that it is possible to expand access at reduced cost. Exploring patterns of use of telecommunications services in marginal markets and demonstrating more realistic levels of demand will improve the quality of regulatory decision-making on access, assist public access providers in offering the most appropriate service, and help facilitate extended access provision by telcos investing in developing countries.*

The research approach adopted to meet these objectives was built on input to detailed questionnaires on the use of telephony in sample communities in three African countries - Botswana, Ghana and Uganda. Little comparable detailed research on the behaviour of telecommunications customers in rural, marginal or newly-served communities in Africa has been undertaken since the restructuring of the telecommunications sector began on the continent in the mid-1990s, and almost none has been published. The findings of the research undertaken for this study therefore provide a near-unique insight into real behaviour by public access telecommunications consumers in representative communities, and offer important evidence which can be used by regulators, telecommunications businesses, development agencies and others in assessing potential demand for telecoms in other unserved areas with comparable demographic characteristics.

The three research countries were chosen because, although all had experienced substantial restructuring of their telecommunications markets, they had undertaken restructuring in significantly different ways - in Botswana, through a single fixed network operator and competing mobile operators; in Ghana, through substantial external investment in both fixed and mobile networks; and in Uganda through the award of a second national operator licence to a company providing access through GSM wireless technology. All three had shown dynamic market growth in the period since liberalisation, overseen by an active and independent regulatory authority willing to participate as a partner in the research project. As well as similarities, there were also important differences between the three countries that provided opportunities for testing comparisons between them - Botswana, for example, having significantly higher GDP *per capita* and lower population density than Ghana or Uganda.

2.2 Objectives

The stated purpose of the project was:

> *'To promote sustainable investment in poor inclusive access provision by informing key stakeholders on market mechanisms amongst rural and low income communities in sub-Saharan Africa'.*

In order to achieve this, the more specific aims of the research were to:

- identify the patterns of use of telephony, particularly public access telephony, in low-income communities in three African countries;
- assess the implications of these research findings for major stakeholders in the national ICT sectors studied;
- and present recommendations to governments, businesses and development agencies concerned with the promotion of access to telephony in similar low-income countries elsewhere in Africa and in other continents.

This report is based on:

- desk and field research on universal access and related issues in Africa;
- analysis of the responses to field research questionnaires undertaken in the three research countries;
- reports and commentaries on the findings prepared by consultants with detailed experience of each national environment;
- and comments from the countries' national regulatory authorities.

It is supported by a number of internal project documents which give much greater detail on the research findings, and are available on request:

1. Literature review
2. Roundtable reports
3. Summary of analysis – Botswana
4. Summary of analysis – Ghana
5. Summary of analysis – Uganda
6. Overview of surveys in three countries (single document)
7. Field survey reports from each country (by Dr. Afullo, Dr. Sakyi-Dawson, and Richard Kibombo)
8. Botswana Analysis documents:
    - Fixed Phones;

- Mobile and SMS;
- Public phone booths;
- Telephone shops;
- Email & Internet.

9. Ghana Analysis documents:
   - Fixed phones;
   - Mobile phones;
   - Public access;
   - Email & Internet
10. Uganda Analysis documents:
   - Phones
   - Public access points
   - Email & Internet
11. Independent policy analysis papers:
   - Botswana
   - Ghana
   - Uganda
   - Overview
12. Final workshop reports
13. Targeted output documents: policy makers, operating companies, and development agencies.

3 Research Methodology

3.1 The project process

The research methodology has taken an iterative approach to identifying priority issues by consulting through roundtables, preliminary field visits (Stage 1 survey), and then gathering data using a household questionnaire, as illustrated in Figure 3. The survey has gathered data on a range of telecommunications services: phones (fixed and mobile), fax, SMS, email and internet.

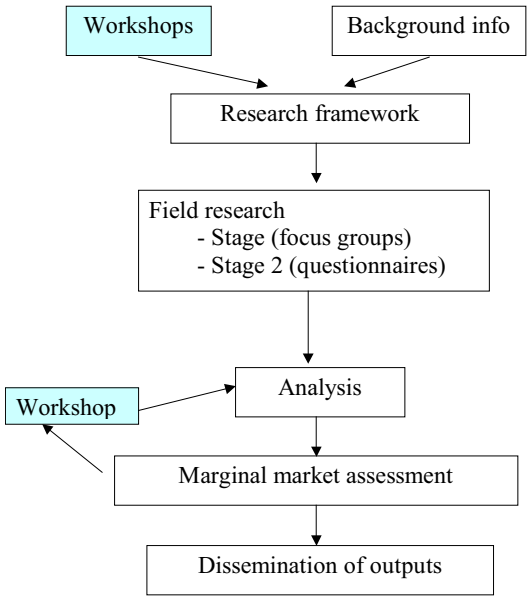

Figure 3 Project process flow chart

In each research country, project design and development was initiated through a **stakeholder workshop** organised through the national regulatory authority, which provided an opportunity for the research partners (Gamos Ltd. and CTO) to explain the objectives of the project, for presentations on the national context from the national regulatory authority and academic partners, and for discussion between stakeholders on their perceptions of the national market and their priority issues for research. Discussions with individual stakeholders, particularly national telecommunications operators, were conducted by the research partners. These, together with desk research, also contributed to project and research design.

The premise that there remains a need for greater understanding of markets was initially tested through a series of **stakeholder roundtable meetings**. These brought representatives from government, private sector, NGO and user groups together, and provided an opportunity for presentations on the national context from the national regulatory authority and academic partners, and for discussion between stakeholders on their perceptions of the national market and their priority issues for research. There was a wide degree of overlap of responses in each country, and the following issues were identified as priorities for investigation under the survey:

- Information needs – what are people communicating; put telecoms in the context of other services.
- Use of services - "auditing" component to gather information on what services are available in rural and low-income areas and how people access these, and a range of factors relating to how people use them and what for.
- Awareness – explore whether people know how to use the technology, and whether there is a need to stimulate awareness of services available.
- Affordability - explore issues of affordability, value, perceived benefit, and willingness to pay.

Even at this stage it was emphasised that data should be gender disaggregated, in order to enable the influence of different gender roles to be assessed.

The survey instrument needed not only to gather quantitative data relating to each of the priority issues given above, but also to capture perceptions. Perceptions are those views held by the subjects, regarding the possible communication services, which influence decision making. These include beliefs regarding advantages and disadvantages, fears and perceived difficulties, current or projected perceptions of need, and peer reactions. It was proposed that the instrument include a section based on the principles of the Theory of Reasoned Action (TORA). The Theory of Reasoned Action (TORA: Ajzen and Fishbein 1980) provides a framework and a methodology for exploring how behaviour is influenced by expectations and evaluation of the outcome and by perceptions of the attitudes of others. It asserts that intention is the most reliable indicator of potential future behaviour, where this is supported by readings of attitudes and subjective norm (peer pressure).

Preliminary surveys were conducted in each country, and used focus group discussions and key informant interviews to explore these topics using an open interview approach guided by checklists drawn up on the basis of findings from the roundtables. These surveys provided an understanding of factors influencing how the poor use telecoms services, and collated a range of beliefs identified by users as advantages and disadvantages of services – these were subsequently used as the basis of belief statements in the questionnaire.

Although tailored in each country to match the telecommunications context, and to address the issues arising from the Stage 1 surveys, the structure of questionnaires used in all

countries was the same:

- The first part of the questionnaire was made up of descriptors e.g. age, gender, occupation etc.
- The second part included a large number of market variables, the data for which can be used to describe existing patterns of use e.g. frequency of use, duration of transactions, direction of traffic, type of calls etc. An important aspect of this are questions relating to how users access services e.g. through booths, shops, or private handsets.
- The third section explored respondents' attitudes and intentions regarding a range of issues identified as potentially influential on people's use of services. These issues are very much country specific, arising from discussions with users; although there was no intention to create any consistency across countries, it was interesting to find a degree of similarity of issues.

The final feedback workshops held in each country provided an opportunity for the team to present the findings and recommendations to the range of stakeholders, and for them to discuss the implications in each national context.

3.2 Background to The Theory of Reasoned Action

The theoretical construct applied to the analysis is based on the 'Theory of reasoned Action' (Ajzen and Fishbein 1980). The Theory of reasoned Action (TRA) has been applied extensively in other disciplinary fields, such as public health, nutrition, agriculture and forestry to explore the cognitive decision-making processes of different social groups. It is acknowledged as one of the most reliable theoretical approaches of understanding the cognitive construct underpinning the decision making process.

"As the name implies, the theory of reasoned action is based on the assumption that human beings usually behave in a sensible manner; that they take account of available information and implicitly or explicitly consider the implications of their actions….. the theory postulates that a person's intention to perform (or not perform) a behaviour is the immediate determinant of that action. Barring unforeseen events, people are expected to act in accordance with their intentions" (Ajzen 1988: 117). The theory is therefore primarily concerned with identifying the factors underlying the formation and change of behavioural intent (Fishbein and Manfredo 1992). Intention, in turn, depends on two independent factors – their own attitude, and the subjective norm. Attitudes depend on beliefs regarding the outcomes of performing this behaviour, and the values attributed to these outcomes. A person's subjective norm (perceived social pressure) is a function both of their normative beliefs regarding how they feel 'important others' would expect them to behave, and their motivation to comply with these "others". Therefore in order to change behaviour it is necessary to change either the pertaining attitudes and / or subjective norms by changing the corresponding underlying beliefs. The following figure summaries the TORA.

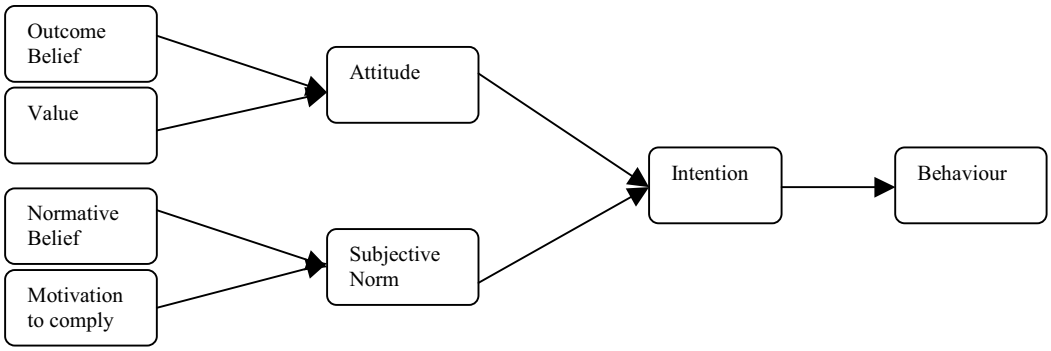

Figure 4: A schematic presentation of the Theory of Reasoned Action

The TORA is best understood as a series of hypotheses linking (1) behaviour to intentions, (2) intentions to a weighted combination of attitudes and subjective norms (social referents), and (3) attitudes and subjective norms to behavioural and normative beliefs. If one accepts the causal chain illustrated in the diagram, it follows that behaviour is ultimately determined by one's underlying beliefs. Therefore changing behaviour is primarily a function of changing this underlying cognitive structure. The TORA is a means to capture the strength of the underlying beliefs and social referents for a particular behaviour and thus provide valuable information for constructing and targeting promotional interventions.

The strength of the relationship between the variable constructs within the theory is normally measured using the correlation coefficient. The multiple-correlation coefficient (R) usually serves as an index of the extent to which behavioural intention can be predicted from the simultaneous consideration of the attitude and subjective norm, using parametric statistics. However, there is concern regarding whether some of these variable scales can be treated as parametric measures (i.e. of equal interval) (Tait 1983 and Carr and Tait 1991). Therefore the non-parametric Spearman Rank Order Correlation (r_s) has been applied to identify the differences in the contribution or influence of the attitude and subjective norm on the intention (I) and similarly the influence of the different outcome attitudes (AO), e.g. (I vs. OA_i), were i represents the particular outcome. In the following analysis only those correlations that are significant at $p = <0.05$ are shown in the tables. However, it is noted that many of the correlation coefficients, though significant, are low, i.e. below $r_s = 0.30$. Ajzen and Fishbein (1980: 99) suggest that only correlations with coefficients of 0.30 or above are likely to be of practical significance. Values between 0.30 and 0.50 are therefore taken to indicate a moderate relationship, while those above 0.50 are taken to represent a strong relationship. However, Inglehart suggests that when open survey data is under consideration, coefficients as low as 0.20 may indicate important differences (Inglehart 1981). Therefore in the following analysis consideration will be given to all correlations with coefficients of 0.20 or above that are significant at $p = <0.05$.

The Mann Whitney U Test (a non-parametric equivalent of the *t* test) is applied to identify significant differences in the TORA variable readings between the comparative categories such as size geographic location, level of education, gender, age, service coverage and patterns of use of service.

3.3 The measurement of the main variables

The measure of **behaviour** is based on indicators of intensity of use of services, typically frequency of use of services.

The respondents strength of **intent** to use the specific ICT in question in the near future was measured on a 5 point bi-polar scale, i.e. very weak (-2) to very strong (+2).

Two measures of **attitude** are applied in the following analysis. The first is what is the stated attitude (SA), a more emotive general expression of how 'helpful' the subjects feel the use of the ICT would be. This is measured on a 5 point bi polar scale, i.e. very unhelpful (-2) to very helpful (+2).

The second attitude measure is the calculated or reasoned attitude (CA). The CA is calculated by first identifying the most salient outcome beliefs common to the community in question regarding the specific ICT. These were identified in a prior survey and presented in the questionnaire. Measures are then taken for each of the salient outcome statements against a 5 point bi-polar scale regarding their 'agreement' (b) with the particular outcome statement and a similar measure of the 'value' (e) attribute to each. The product of the individual outcome belief and value measures (b*e) give the individual outcome attitudes (OAs) (possible range -4 to +4). The OA products are added to give the calculated attitude (i.e. $CA = \Sigma b_i * e_i$). For example, in the case of mobile phone use in Botswana a list of 29 salient outcome beliefs was addressed, thus the possible range for the CA measure is -116 to +116.

The individual outcome (b*e) products (OAs) are correlated separately with the stated intention (I) so as to identify which have most influence on the decision making process. The direction of the OA, i.e. whether it supports the proposed behaviour or not and the positive or negative nature of the attributed belief and value indicate whether the particular influential outcome attitude (OA) acts as a barrier or promotes or drives the use of the ICT in question.

A similar approach is normally taken to the measurement of the **subjective norm**, i.e. two measures are used, the stated subjective norm (SN) and the calculated subjective norm (CSN). In the case of this analysis only the general measure of the subjective norm (SN) is applied.

The **SN** is a measure of the respondents' beliefs regarding whether those they respect most in will support their use of the ICT in question. The response is measured on a 5 point bi polar scale, i.e. very opposed (-2) to very supportive (+2).

The difference in the influence of the the subjects' attitude and subjective norm on their intention (I) to use the particular ICT in the near future is identified by comparing the (SA vs. I) and (SN vs. I) correlations.

The overall attitude to a specific behaviour is measured by taking the sum of a number of specific outcome attitudes. A cognitive **barrier or driver** is an attitude, either negative or positive regarding a specific possible outcome resulting from the subjects' performance of the behaviour, which correlates significantly with the subjects' stated intention to perform the behaviour in question. The direction of the correlation indicates whether the specific outcome attitude is acting as a barrier or driver.

3.4 Research locations and sampling methodology

3.4.1 Sampling Strategy

The selection of research locations within individual countries was undertaken by Gamos Ltd in conjunction with national research partners, in the light of advice from national regulatory authorities and national telecommunications operators.

For the application of the stage two survey, samples were acquired using a randomised-stratified cluster sampling process. The countries were divided into different areas of geographic coverage (nodes) from which three were selected, which incorporated the four levels of service coverage considered, i.e. no coverage, low, medium and high coverage. The samples were divided between the selected nodes and then stratified by service coverage.

- ***No coverage*** was determined by those living in the next defined community beyond the coverage of service within a particular node, usually representing those furthest from the centre of the node. This meant that those sampled without service coverage were usually within 20 kilometres at most from an area with some form of public telecommunication access. Therefore the survey did not capture those living at a greater distance that 20 to 30 kilometres of a point of public access.
- ***Low*** coverage, initially treated as access to fixed line service only. However, due to the difference in fixed line provision within each country, distance from the centre of the node tended to represent the level of coverage, whether by mobile or fixed line.
- ***Medium*** coverage, initially intended to represent areas with access to the fixed line and at least one mobile provider. Again tended to be determined more by distance for the centre node, particularly in Botswana.
- ***High*** coverage was intended to sample those in areas with access to fixed line and more than one mobile provider. These tended to be in closest proximity to the centres of 'node'.

This approach ensured the sampling of rural, peri-urban and urban areas. A deliberate decision not to sample the capitals was taken in Botswana and Ghana.

Ghana	3 geographic nodes	630
Uganda	2 Districts	420
	Kampala	100
Botswana	3 geographic nodes	630

Due to the different telecommunications context in Uganda, a different sampling strategy was adopted. The reason for this was that, in contrast to the other countries, there appeared to be no effective internet infrastructure outside of the major cities in Uganda, so a separate survey instrument was designed for use in Kampala in order to gather data on email / internet use. However, even with this approach, the research has found low levels of internet use in all countries.

Given the need to address several different ICTs in each country, different questionnaires were developed. In each case the descriptive and patterns of use questions were common to all. However, the specific ICT TORA related questions were split between the questionnaires e.g. in Botswana, three questionnaires were developed:

- Questionnaire A addressed the TORA questions related to Fixed line phones, SMS and internet cafes.
- Questionnaire B addressed the TORA questions related to mobile phones, public booths and scratch cards.
- Questionnaire C addressed the internet, phone shops and private access.

In Botswana each questionnaire had a sample of 210 and each was applied equally and simultaneously across the nodes and stratified by service coverage. This meant that the samples for each questionnaire could be treated as separate and statistically relevant, or combined when considering the patterns of use data. However, when the patterns of use data from the different questionnaires are compared no significant differences are noted. In the detailed analysis of the Botswana data the tendency has been to work with the different questionnaire samples separately. Where the data has been combined this is noted, e.g. in reviewing the patterns of use regarding the use of mobiles and the SMS, and the use of the internet and in descriptive summaries.

A similar approach was applied in Ghana where two questionnaires were applied so as to capture the TORA information regarding the ICTs addressed while maintaining the same descriptors and patterns of use questions. These where also distributed equally across the sample. In the case of Ghana the patterns of use data analysis is based on the combined finding of the two questionnaires.

In all the countries the analysis of the TORA related data was based on the relevant questionnaire's sample.

3.4.2 Botswana

While Kgatleng, Kweneng, Southern and South East District were chosen for the Stage 1 visits, on the basis that they had been identified, by the roundtable, to be representative of both rural and low-income areas. The stage 2-survey team identified three other districts that fit into each of the four service levels (High, Medium, Low and No access). The selected areas were Ngamiland, Khalagadi and Central districts.

The sampling scheme used and agreed on was the stratified cluster sampling. The sampled node was divided into four (4) strata according to the level of service coverage on the area. The stratification of the cluster was done in order to reduce the variance on the estimates and thus better inference for the whole. We must note that the gain in stratification of clusters is higher than stratification of elements. The stratum that was agreed on was high service level, medium service level, low service level and no access service level. We assumed that the distance from the centre of the node would give us the strata.

As the two main objectives of the survey was to ascertain information needs and uses of telecommunication and internet services and barriers and constraints to increased use of telecommunication and internet services in the rural and low-income urban areas, the high and medium strata was to supply information on perception and attitude of people on the use of telecommunication and internet services. The low and no access strata supplied information on the constraints on the demand of telecommunication and internet services and the level of awareness for these services. Within each service level area a mix of rural and urban clusters were selected. The ratio depended largely on practical considerations but the national ratio of around 70/30 (rural/urban) was used as a guideline.

Table 1 below shows the areas in which interviews took place in Maun, Selebi Phikwe and Tsabong according to the four strata.

Table 1 Areas where interviews took place

Zones	High Service Level	Medium Service Level	Low Service Level	No access Service Level
Tsabong	Tsabong Centre	Maubelo Village	Omaweneno Village	Maralaleng Village
Selebi Phikwe	Selebi Phikwe Centre	Mmadinare	Tobane and Sefophe	Damochujenaa
Maun	Maun Centre	Komana	Chanoga	Shorobe

The chosen sample size was not based on households but on individuals as dictated on the study. Although households were used to obtain respondents, the head of the family was not necessarily interviewed on behalf of the household. The sample also consisted of individuals who used the internet who were usually found in the internet cafes.

Since we did not have the sample frame of all people using the services, we could not determine a prior which household to visit. Therefore when we got to the field after ascertaining the clusters, we randomised our respondents within the clusters. We evenly spread the sample size within the clusters so as to get statistically significant sample sizes.

3.4.3 Ghana

The questionnaire was applied in communities in each of three geographical locations (south, middle, north); communities were selected to achieve a spread across four categories of service level – none, low (fixed line only), medium (fixed line plus one mobile operator), high (fixed line plus two or more mobile operators). Areas with no service provision were defined as the next discrete community beyond the current range of service provision i.e. around 3-4 km from the nearest community which does have services. Within each area, clusters were selected at random, and households within each cluster were selected randomly.

Within each service level area, a mix of rural and urban clusters were selected. The ratio will depend largely on practical considerations (e.g. how many communities exist in an identified area) but the national ratio of around 70/30 (rural / urban) was used as a guideline.

3.4.4 Uganda

In each of the rural study districts, one urban sub-county or major town with 'mature' telecommunication services and two 'newly-served' rural sub-counties were purposively selected to represent the study districts. Within each rural district, the urban sub-county was selected on the basis of size (town council or bigger), maturity of existing telecommunication services, level of commercial activity as well as other indicators of level of development like the existing social infrastructure such as schools, health units, roads etc. Then in each of the selected sub-counties, 2 – 3 parishes were purposively selected to represent each of the study sub-counties. The selection criteria for the parishes was based on availability within those parishes of potential users of telecommunication services (basing on information provided by the key-informants and the local field assistants). Then, from each of the selected parishes, 3 – 5 villages were randomly selected and these served the purpose of enumeration areas for

this study. In total, 10 villages per sub-county or 30 villages (clusters) per district were selected for purposes of drawing the study sample.

Thus, in Luwero District, Wobulenzi Town Council was selected as the urban sub-county with 'mature' telecommunication services while Nakaseke and Kasangombe were selected to represent the 'newly- served' rural sub-counties.

In Kabale District, Kabale Municipality was selected as the urban sub-county with 'mature' telecommunication services while Bubale and Kyanamira were selected to represent the 'newly-served' rural sub-counties.

Sub-county	District	Rural / urban	Mobile provision
Wobulenzi	Luwero	Urban	May 2000
Nakaseke	Luwero	Rural	May 2000
Kasangombe	Luwero	Rural	May 2000
Kabale Municipality	Kabale	Urban	1999
Bubale	Kabale	Rural	1999
Kyanamira	Kabale	Rural	1999

In Kampala which is purely urban, one moderately rich division (a division is equivalent to a sub-county) was purposively selected. For purposes of this study, Nakawa, which is one of the five Divisions that form Kampala District, was selected.

In Kampala District, simple random sampling was used to select the potential users of telecommunication services. This was because, in Kampala, everybody was deemed to be a potential user. A total of 100 respondents were randomly selected for interview from five of the parishes (20 per parish) from Nakawa Division. On the other hand, usage of telecommunication services in the rural areas is very much a function of the type of economic activity one is engaged in as well as personal or household income. Using the knowledge of the local field assistants and information provided by the key-informants, groups of potential users of telecommunication services in each of the rural study sub-county were identified and their approximate relative potential to use the services established. These proportions were used to determine the final composition of the study sample within each selected study sub-county. From each of the 10 villages that were selected for the study from within each sub-county, 7 representative potential users were randomly interviewed giving a total of 70 interviews conducted per sub-county.

The following potential user groups were identified within each of the rural study sub-counties and the proportions show the relative importance (in terms of potential to use telecommunication services) of each group:

Potential Users	***Kabale District***			***Luwero District***		
	Bubale	**Kyanamira**	**Kabale Mun.**	**Nakaseke**	**Kasangombe**	**Wobulenzi Town**
Traders	35%	35%	55%	20%	15%	25%
Farmers	20%	20%	5%	50%	40%	20%
Salaried	40%	40%	30%	10%	10%	20%
Students	5%	5%	10%	10%	15%	20%
Others (e.g House wives, unemployed)	-	-	-	10%	20%	15%

The above distribution reveals some interesting patterns among potential users of telecommunication services in the two rural study districts. Whereas an overwhelming majority of the rural population in both Kabale and Luwero are engaged in crop cultivation, according to the key informants, more salaried people in rural Kabale use telecommunication services than the farmers. The converse is true with respect to Luwero District. One of the reasons for this apparent divergence is the fact that the rural population of Kabale is too poor to afford using the services. Furthermore, compared to Luwero, Kabale has many more NGOs and therefore bigger numbers of salaried employees. These have the money to spend on such services like telecommunications and also have a higher need to keep in touch with either their colleagues within and outside the district or with their family members whom they might have left behind in Kampala or other parts of the country.

It can also be observed that that the main potential users of telecommunication services in the urban Kabale are the traders while in urban Luwero, the distribution of potential users of telecommunication services is more or less uniform among all the identified potential user groups. This is perhaps brought about by the fact that, compared to Luwero, Kabale is a much more urban and commercialised town.

4 Field Research and Findings

4.1 Research countries: National market characteristics

4.1.1 Botswana

Botswana is a relatively high-income developing country in Southern Africa with a GDP (purchasing power parity) *per capita* of US$7,184 (2000) and a population of 1.6 million (2000). It has a low population density with many communities dispersed in arid rural areas which pose substantial network roll-out problems for both fixed and mobile telecommunications operators. Total telecoms revenue was 2.2% of GDP in 1999.

Botswana's telecommunications market is regulated by the Botswana Telecommunications Authority. At the time of the research, it included:

- Botswana Telecommunications Corporation with 145,852 lines in 2002 (a teledensity of approximately 9%). The comparable subscriber figure for 1998 was 102,016;
- two competing mobile operators – Mascom Wireless, with 278,000 subscribers in 2002, and Vista Cellular, with 109,000 subscribers at the same date. Both companies began service in 1998;
- an overall total of telephone subscribers of 532,852 (a teledensity of 33%);
- and competitive markets for leased lines, fixed satellite services and internet service provision.

The government of Botswana has not imposed formal universal access obligations on BTC, but has allocated funding to BTC to fulfil Rural Telecommunications Programme targets including provision of telephony to all villages with 500 or more inhabitants. BTC has used VSAT and WLL infrastructure in meeting these objectives in remote rural areas. The government has required the mobile operators to install a minimum of 500 public access booths (1998-2002) and spend 0.25% of turnover on social development objectives.

The research locations selected in Botswana were:

Zone	High Service Level	Medium Service Level	Low Service Level	No access Service Level
Tsabong	Tsabong Centre	Maubelo Village	Omaweneno Village	Maralaleng Village
Selebi Phikwe	Selebi Phikwe Centre	Mmadinare	Tobane and Sefophe	Damochujenaa
Maun	Maun Centre	Komana	Chanoga	Shorobe

4.1.2 Ghana

Ghana is a low-income developing country in West Africa with a GDP (purchasing power parity) *per capita* of US$1,964 (2000) and a population of 20,100,000 (2000).

Ghana's telecommunications market is regulated by the National Communications Authority of Ghana (NCA). At the time of the research, it included:

- three fixed network licenced operators – Ghana Telecom (the former state-owned incumbent operator, now managed with Telenor), with 300,000 subscribers in 2002, WESTEL with 3,000 and Capital Telecom with 500 subscribers at the same date;
- four competing mobile operators – Mobitel/Millicom with 55,000 subscribers in 2002, Celltel/Kasapa with 10,000, Scancom with 280,000 and Ghana Telecom with 100,000 subscribers at the same date;
- liberalised markets for other services; and
- an overall total of telephone subscribers of 748,500 (a teledensity of 3.5%))

The licences of Ghana Telecom and WESTEL include universal access obligations. Ghana Telecom is required to plan the extension of services to the whole national territory, with possible funding from a Ghana Investment Fund for Telecommunications derived from a levy on the net revenue of telecommunications operators.

The three research locations selected in Ghana were:

Zone	High Service Level	Medium Service Level	Low Service Level	No access Service Level
South	Cape Coast and Ho	Agona and Akatsi	Agona and Akatsi	Agona and Akatsi
Middle	Sunyani	Wenchi	Wenchi	Wenchi
North	Tamale	Savelugu / Nanton	West Mamprusi	Savelugu / Nanton

4.1.3 Uganda

Uganda is a Least Developed Country in East Africa with a GDP (purchasing power parity) *per capita* of US$1,208 (2000) and a population of 23,300,000 (2000). It has experienced strong economic growth in the past decade following a long period of economic decline and civil conflict. Population density is relatively high in most of the country, while some remote areas currently suffer from significant problems of insecurity.

Uganda's telecommunications market is regulated by the Uganda Communications

Commission (UCC). At the time of the research, it included:

- two national network operators – Uganda Telecom Ltd. (UTL), the historic incumbent operator, now part-privatised and operating both fixed and mobile networks – and MTN Uganda, a South African owned company implementing its national network licence through GSM wireless technology;
- a third mobile operator – Celtel;
- telephone subscribers numbering:
  - 59,472 fixed lines (UTL/MTN, end 2002) – a decline from 61,462 two years previously);
  - 336,000 MTN mobile lines (end 2002);
  - 95,400 UTL mobile lines (July 2002);
  - 37,600 Celtel mobile lines (July 2002);
- an overall total of telephone subscribers of 528,472 subscribers (a teledensity of 2.3%);
- and competition in other service markets.

Uganda's telephony service provision is therefore largely and increasingly supplied by mobile networks using GSM technology (which is less suitable for internet access than fixed technology).

The government of Uganda included universal access targets in licensing both UTL and MTN, but the target figures have been easily exceeded through mobile service. A Rural Communications Development Fund has been established, derived from a levy on operator turnover and World Bank support, to provide subsidies for telephony and internet network roll-out into areas that current operators have indicated cannot provide an economic return at present. This Fund has recently made its first tranche of allocations.

The three research locations selected in Uganda were:

District	**Urban communities**	**Rural communities**
Kabale	Kabale municipality	Bubale and Kyanamira
Luwero	Wobulenzi Town	Nakaseke and Kasangombe
Kampala	Nakawa division	-

4.1.4 Teledensity summary

The following table summarises the individual teledensity level (i.e. number of telephones per 100 population) in each of the three study countries.

Individual teledensity measures the level of ownership, rather than usage, of telephony and is therefore closely correlated with *per capita* GDP. In most societies, average household expenditure on telecommunications (ownership and/or usage) is between 2% and 4% of income. In the context of universal access, therefore, individual teledensity provides evidence for the propensity to purchase private access to telephony rather than rely on public access facilities.

Fixed line, mobile and public payphones teledensities (lines per 100 pop.; ITU; 2000)

	Botswana	Ghana	Uganda	Average (unweight
Fixed Line Teledensity	9.3	1.2	0.3	3.6
Mobile Teledensity	12.3	0.7	0.9	4.6
Fixed + Mobile density	21.6	1.8	1.1	8.2
Mobile/Fixed density ratio	1.33	0.55	3.04	1.3
Public payphones (per 1000 pop.)	1.86	0.16	0.06	0.69

4.2 Description of Samples

The gender balance of respondents is given in the following table:

	Ghana	*Uganda*	*Botswana*	*Overall*
Male	69%	60%	44%	58%
Female	31%	40%	56%	42%

Table 2 Balance of gender in the 2nd survey sample.

Figure 5 and Figure 6 present the age and education breakdown of each sample.

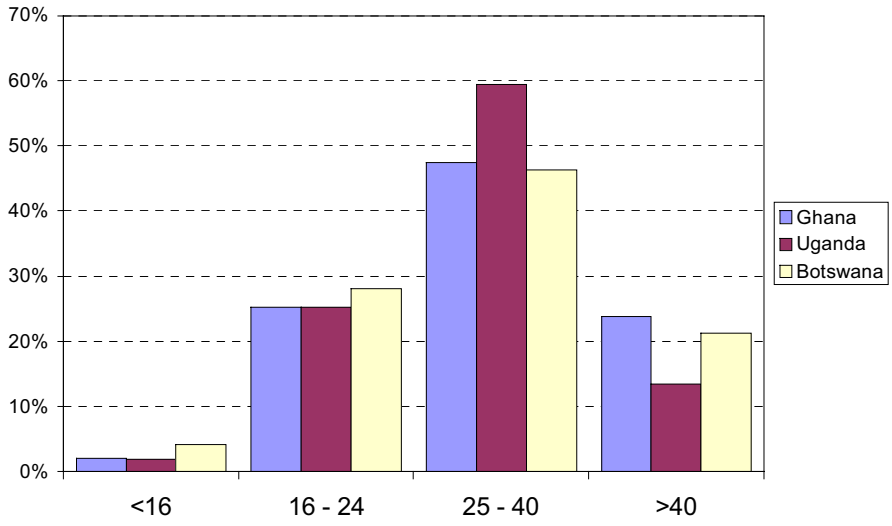

Figure 5 Breakdown of ages of respondents

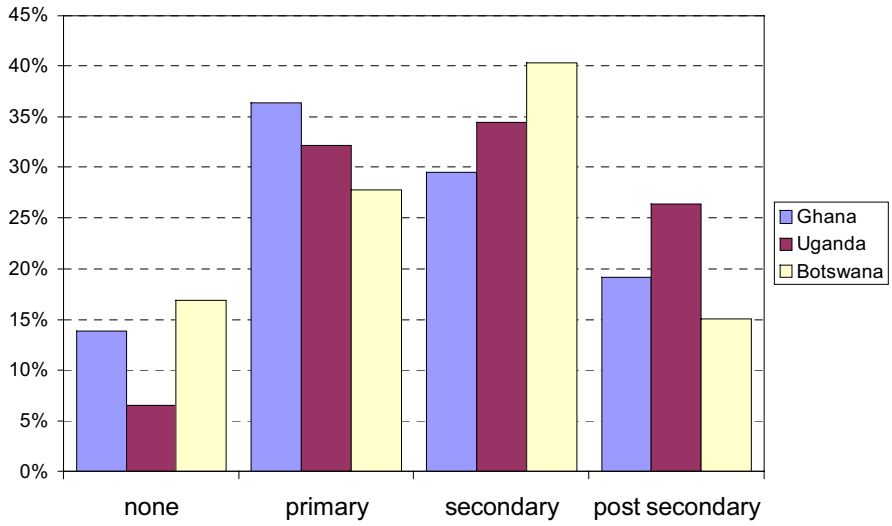

Figure 6 Breakdown of level of education of respondents

Individuals are generally not willing to part with information regarding their income or where the figure is given, it is either overstated or understated. The research indicated that the individuals with low levels of education and low incomes reside in the areas with no access or low access. Only 15% of individuals from no access areas indicated that they do not use the telephone.

The most common occupations were trader, farmer and salaried; the Ghana questionnaire included a 'self-employed' category which was the mode, but is likely to be made up mostly of farmers and traders. An example from Ghana, showing gender differences, is presented in Figure 7.

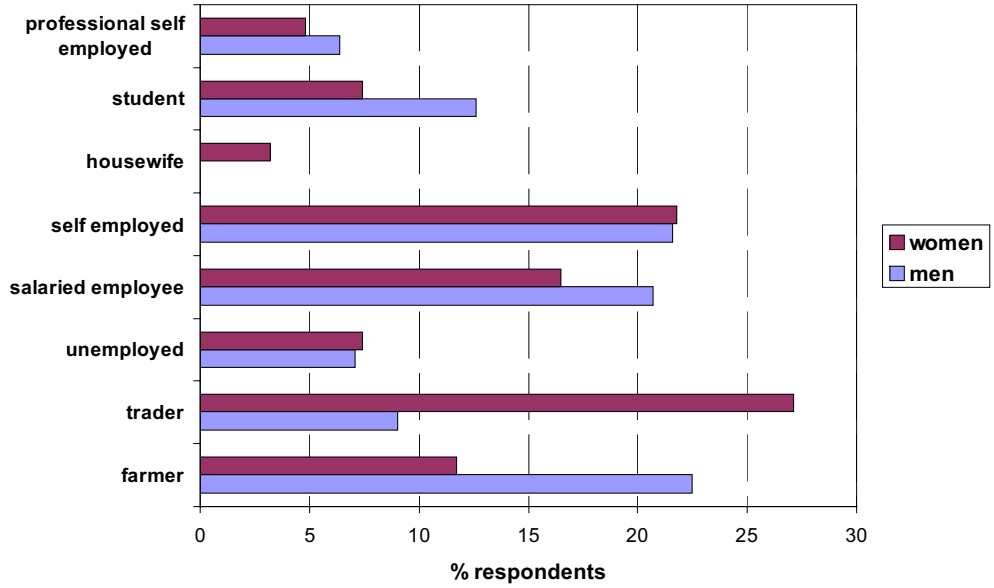

Figure 7 Gender differences in occupations (Ghana)

Figure 8 shows how the samples in Botswana and Ghana are balanced between the four levels of service. In Uganda, 52% of the sample is classified as rural.

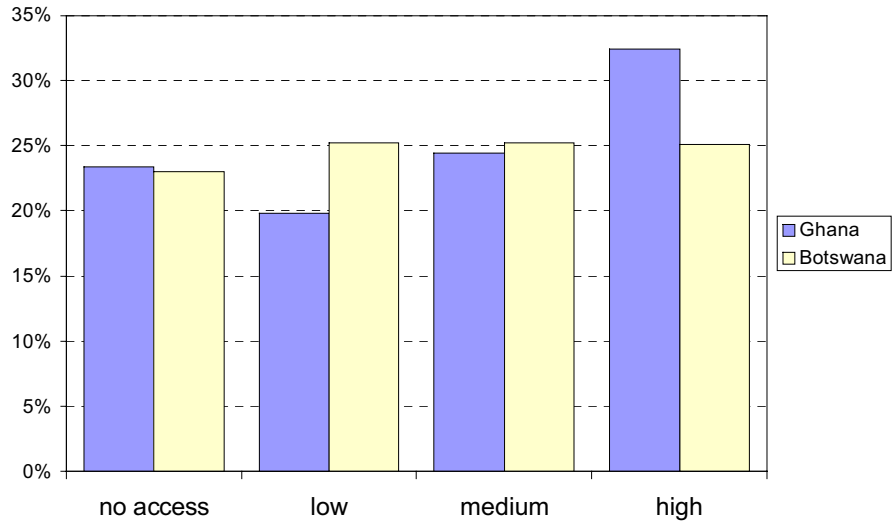

Figure 8 Breakdown of service levels

Most respondents in all samples had members of their immediate family living in cities within the country, and / or living abroad:

	Ghana	***Uganda***	***Botswana***
Family living in cities in country	96%	79%	87%
Family living abroad	58%	24%	27%

Table 3 Percentage of respondents with family living in a different location.

In Ghana and Uganda, the female sector was younger and had lower levels of education (more with primary education, less with post secondary education). Women respondents in Ghana registered a higher incidence of family members living abroad (64% compared with 55% by men). It was noted in the Stage 1 survey that several women have husbands working abroad.

4.3 Use of Telecommunications Services

Findings showed that a surprisingly high proportion of respondents made 'regular' use of **telephony** (defined as use within the last three months). It is interesting to note that the proportion of respondents in remote rural areas[7] who make regular use of services is only marginally smaller – 75% compared with 81%. This indicates that people are prepared to make the effort (incurring costs and time) to travel in order to access services and/or use them when travelling. Individual country results show relatively little variation around these average figures, suggesting that these are likely to be robust across a range of national economic and telecommunications environments.

These figures hide the relative usage of **fixed** and **mobile** phones. Ghana has the highest usage of fixed line telephones, while Uganda has the highest usage of mobile telephones. This reflects both availability (e.g. the fixed network is the junior partner in telecommunications supply in Uganda) and affordability (e.g. more people can afford

[7] Defined as rural sub-counties in Uganda, and areas with no access to any networks in Botswana and Ghana.

personal mobiles in relatively wealthy Botswana).

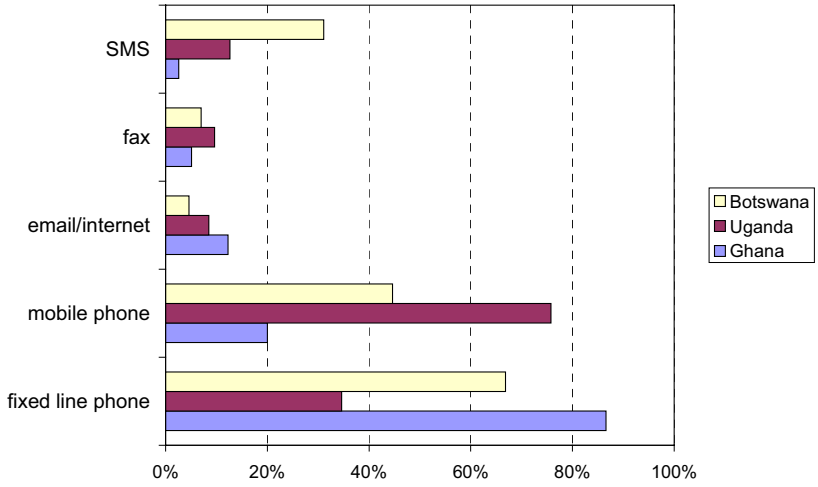

Figure 9 Use of telecommunications services (% of respondents)[8]

SMS use is lowest in Ghana, where fixed line telephony is dominant; it is interesting to note that although mobile use is highest in Uganda, the use of SMS is highest in Botswana, and this probably reflects a more sophisticated customer base. The principal use of SMS is for communicating with friends and family, followed by business use. Some people access SMS services using internet based services. Data confirms the value of SMS as a low cost means of communication; for example, most users in Ghana pay less than 25 cents to send a message, whilst the mode for fixed line calls is 44 cents (range 25 – 62 cents), and for mobile calls is 94 cents (range 62 – 125 cents).

Although an established technology, **fax** usage is low. Anecdotal evidence indicates that reliability is low, and there are few places that offer the service. Business use of fax is high, on a par with social matters, and there is a relatively broad spread of costs incurred in sending faxes.

In contrast to the widespread regular use of telephones, the research revealed low levels of **email and internet** (browsing) use in all three countries, even in areas of high service coverage. On average across the three countries, less than 10% of respondents claimed to use email services or browse the internet on a regular basis. Usage is highest in Ghana and lowest in Botswana[9].

4.4 Patterns of use – telephones

4.4.1 Choices available to customers

Customers generally have a choice not only of telephone technology to use (fixed line phones or mobile phones), but also of point of access. In most countries the points of access are restricted to public phone booths or commercial providers (private telephone shops), and this

[8] Fixed / mobile breakdown estimated for total Uganda sample including Kampala; based on combined sample for Botswana.
[9] The figures for Uganda are not directly comparable as the survey includes a sample from the capital city of Kampala.

is especially true of rural areas. It was evident that a significant number of people in all countries have access to personal mobile phones at home (32% in Uganda[10], 37% in Botswana and 7% in Ghana). These choices are illustrated in Figure 10, where individuals includes home mobiles.

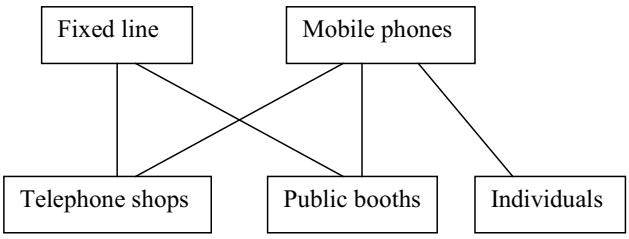

Figure 10 Types of phone, and means of public access

4.4.2 Fixed and Mobile Telephone Use – overall

The samples in all three countries were taken from a variety of areas with different experience of telecommunications availability, including areas which were as yet unserved by telecoms operating companies. Nevertheless, the findings showed that a very high proportion of respondents in all three countries made 'regular' use of telephony (defined as use within the last three months), including a substantial proportion of those living in areas without direct service (who therefore needed to travel some distance to use a telephone).

The following table presents the individual and three-country average for the percentage of respondents from the whole sample, who claim to use a telephone, fixed or mobile, on a regular basis.

'Regular' Use of Phones, by Technology % (whole sample)

	Botswana	Ghana	Uganda[11]	Average
Any type of Phone	78%	88%	78%	81%
Fixed Line Phones	67%	87%	35%	63%
Mobile Phones	45%	20%	76%	47%
Mobile/Fixed Ratio	0.67	0.23	2.17	0.75

According to the above table, an average of over 80% of all respondents in the three countries use a telephone on a regular basis. This suggests that, if telephone service is made accessible, some four out of five potential users will in fact make use of a telephone. This indicates likely substantial demand for telephone usage in most communities, at a level which is probably significantly above that historically anticipated by policymakers and telecommunications operators – and perhaps also that used in the development of universal access strategies and telco network expansion plans.

The individual country results show relatively little variation around this average, and what difference there is is as likely to be attributable to sampling differences as to national usage

[10] This is artificially high as the sample includes Kampala; however, the figure for the two rural districts is still high at 24%.
[11] The Uganda questionnaire did not gather data on fixed / mobile use; this split has been estimated from different types of access, and should be treated with some caution.

characteristics. This suggests that the result – i.e. the very high proportion of potential users making use of telephone service – is likely to be relatively robust across a wider range of national economic and telecommunications environments.

4.4.3 Fixed and Mobile Telephone Use – no-access areas and rural areas

This table presents the individual and three-country average for the percentage of respondents who claim to use a telephone, fixed or mobile, on a regular basis from the sub-samples of respondents who live in Rural Areas of 'No Access Areas' (i.e. areas in which no direct telecommunications service is available, and from which respondents need to travel in order to use a telephone).

Regular Use of Phones % (Sub-sample: No Access Areas and Rural Areas)

	Botswana	Ghana	Uganda[12]	Average
Any type of Phone	76%	80%	69%	75%
Fixed Line Phones	76%	79%	27%	61%
Mobile Phones	29%	6%	66%	34%
Mobile/Fixed Ratio	0.38	0.08	2.44	0.56

As is to be expected, the individual and three-country average percentages are lower for these respondents than for the sample as a whole – but the difference, at 6%, 2% and 13% for overall, fixed and mobile use respectively, is not great.

As the 'no access' areas covered by the study were selected on the margins of served areas, this indicates that there a high proportion of respondents in No Access Areas are prepared to travel a reasonable distance on a regular basis to access telephony services. Again, because the results are relatively consistent across the three countries, this suggests that the overall finding will be relatively robust elsewhere in Africa.

4.4.4 Fixed versus mobile service

While the overall usage of telephones is relatively stable across the three countries, the tables above show that there is significant variation across the countries between the relative use of mobile *versus* fixed line telephones. Ghana has the highest relative and absolute usage of fixed line telephones, while Uganda has the highest absolute and relative usage of mobile telephones.

The relationship between availability of fixed and mobile telephones is the main factor influencing the relative level of use between them in the three countries. Ghana has the lowest relative and absolute mobile density of the three countries, while mobile telephone availability and use are relatively highest in Uganda (where the fixed network is very much the junior partner in telecommunications service supply). In Botswana, a richer country, a higher proportion of potential users can afford personal mobile service.

The Botswana evidence shows, however, how this relationship is affected by the different level of use found for competing fixed and mobile networks. While there are more mobile

[12] Estimated mobile / fixed split.

than fixed telephones in Botswana (in the ratio of 1.3:1), the latter are nevertheless used more frequently (in the ratio of 1.5:1). This is likely to be a result of two factors: the relative price of the two services and their relative degree of availability.

4.4.5 Frequency of use

The following tables show the frequency of use of fixed and mobile telephones reported in Botswana and Ghana (this distinction was not made in Uganda, due to the dominance of GSM – frequency of use, irrespective of technology, is presented in Section 4.4.8):

FIXED TELEPHONES	Botswana	Ghana	Average
not used	33%	14%	23%
up to twice p,m.	29%	38%	33%
1 – 4 times p.m.	18%	31%	24%
1 – 2 times p.d.	11%	8%	10%
over twice p.d.	9%	9%	9%

MOBILE TELEPHONES	Botswana	Ghana	Average
not used	55%	80%	68%
up to twice p,m.	8%	10%	9%
1 – 4 times p.m.	12%	4%	8%
1 – 2 times p.d.	9%	2%	6%
over twice p.d.	16%	4%	10%

The variation in use of fixed and mobile telephones in these tables results primarily from differences in availability of the two main network types. Fixed telephones are more available for public access in Botswana and Ghana than mobile telephones, whereas mobile telephony (i.e. in particular, the GSM network of the second national operator MTN) is the only available public access service in many parts of Uganda. The figures for mobile use in Botswana are also higher because the much higher average income levels in that country allow a far higher proportion of its citizens to afford personal ownership of mobile handsets.

As is to be expected, in all three countries, more frequent users of telephony are more likely to use mobile services (as a substantial proportion of frequent users are likely to own their own handsets).

Text messaging (SMS) was used by a higher proportion of respondents in Botswana than the other countries (Figure 9), presumably because of the higher proportion of direct ownership of mobile handsets. 68% of the Botswana respondents with mobile telephones claimed to use SMS, about a third of these using the service two or more times daily. Only 13% of Ghanaian mobile users used SMS.

4.4.6 Means of access – overall

The following table indicates which points of access to services (both public and private) are used by respondents in each of the three countries – note that these are not mutually exclusive.

	Botswana	Ghana	Uganda
booths	66%	55%	46%
teleshops	45%	76%	63%*
private	39%	30%	28%**

* includes access through work, and friends and family
** home mobile phones only.

Other noteworthy means of access include a service offered by operators at local telephone exchanges in Ghana, which was clearly an important means of access for women. The principal means of access included in the figure given in the table above for access through teleshops in Uganda is teleshops (using fixed and mobile phones). However, it also includes access through individuals offering a commercial service through private mobile phones.

The high level of ownership of mobile phones in Botswana (over 35% of respondents) is a result of the country's relatively high income levels. Overall teledensity in Botswana is over 20% (including 12.3% mobile teledensity) compared with figures of well below 5% in the other research countries. The Botswana figure might have been higher still had mains electricity been more widely available: the lack of access to power was cited by some respondents as a barrier to both internet and mobile use (the latter because of the need for users to recharge batteries). Nevertheless, the majority of users of mobile phones in Botswana still gain access through public facilities.

The high figure for mobile ownership in Uganda is an outcome of the preponderance of mobile service in that country and the inclusion of a region of the capital city in the sample. In Ghana, only 20% of the sample used mobile phones, and almost all of those that did not do so considered themselves as having no access to them. In Ghana, there is no significant difference in take up of mobile telephony between areas with one and areas with more competing mobile operators providing service.

4.4.7 Means of access – public access points

This section of the report compares the use and views of users of the two main forms of public access available in the study countries:

- public access facilities provided by the telecommunications operating companies (usually unattended, except in Uganda), described in the following as ***booths***;
- and access facilities provided by private entrepreneurs, either independently or through some kind of concession or franchising arrangement with a telco, described in the following as ***teleshops***.

The table below shows that, on average, 75% of respondents from the three country sample use some form of public access point on a regular basis. For the whole sample for the three countries, regular use of public booths and teleshops is very similar, at 56% and 61%, respectively.

On an individual country basis, there are larger differences in the comparative regular use of booths and teleshops, but these are may be due to differences in the relative supply across the three countries, rather than a difference in national preferences for one or other form of access.

Regular Use of Public Access points, by type % (Whole Sample)

	Botswana	Ghana	Uganda	Average
Any type of Public Access	69%	85%	72%	75%
Public Booths	66%	55%	46%	56%
Public Teleshops	45%	76%	63%	61%

The table below presents the individual and three-country average for the percentage of respondents from the No Access Areas and Rural Areas sub-sample, who claim to use a public access telephone point on a regular basis.

Regular Use of Public Access points, by type % (Sub-sample: No Access and Rural Areas)

	Botswana	Ghana	Uganda	Average
Any type of Public Access	73%	76%	64%	71%
Public Booths	72%	39%	33%	48%
Public Teleshops	40%	71%	59%	57%

A comparison of these data suggests that respondents living in rural areas and those in areas without coverage will use public access points almost as regularly as respondents from the whole sample. This is partly, no doubt, due to people using telephones when they are visiting served areas for other reasons, but also suggests that a significant percentage of respondents in unserved areas take the time and spend the required money to travel to public access points outside of the areas in which they reside in order to make and receive telephone calls.

In Botswana, for example, 35% of respondents living in No Access Areas reported using fixed phone services once or more per week, while 11% of mobile handset owners also lived outside the reach of current mobile coverage and so could only use their handsets while travelling. The average cost of travelling to use a telephone was significant in all three countries, as was the average time required (87.5% spending over 30 minutes on the journey). The high travel and opportunity costs involved suggest that significant savings would be made by users with local access, a proportion of which would be diverted to additional usage.

Over 70% of Ghanaian respondents living in No Access Areas also travelled in order to access services at public facilities.

This suggests again that there is substantial demand for telephony services outside currently served areas and that revenue levels per user in unserved areas are unlikely to be significantly lower than those in areas currently served. The level of usage recorded by respondents living in No Access Areas at present would increase significantly if services were more accessible in their home areas.

The table above shows how teleshops are the dominant point of access in rural areas of Ghana and Uganda. Attended service provides a number of useful features, including overcoming unfamiliarity with the technology, taking messages, and facilitating incoming calls. These features are of value in a new market, and for which customers are prepared to pay a premium. There is evidence that in an established market, the preference shifts towards

booths, which offer the cheapest access to phones.

4.4.8 Frequency of use – public access facilities

The data for frequency of use of public access facilities are set out in the following tables.

BOOTHS	Botswana	Ghana	Uganda	Average
not used	34%	44%	54%	43%
up to twice p,m.	36%	26%	27%	30%
1 – 4 times p.m.	17%	18%	13%	16%
1 – 2 times p.d.	8%	6%	4%	6%
over twice p.d.	5%	5%	2%	4%

TELESHOPS	Botswana	Ghana	Uganda*	Average
not used	55%	23%	34%	38%
up to twice p,m.	22%	41%	38%	33%
1 – 4 times p.m.	14%	24%	17%	18%
1 – 2 times p.d.	6%	5%	6%	6%
over twice p.d.	4%	7%	3%	5%

* includes access through work, and friends and family

Usage of public access facilities increases with level of educational attainment up to the point between secondary and post-secondary education. Those with post-secondary education are less inclined to use public access facilities than those with secondary education only, presumably because a higher proportion have private access to telephony.

4.4.9 Purpose of use

Respondents in all three countries were asked to identify their principal purposes for making and receiving telephone calls. The results suggest that there is a significant similarity between the three countries in this respect.

By far the largest and the most significant purpose of calls in all three countries and across all respondent groupings was concerned with 'friends and families'. For the three countries as a whole, on average, approximately 70% of all respondents regularly made and received calls related to friends and family, whether simply keeping in touch or concerned with financial matters. Of other types of calls, the most common are related to business (average around 15% of respondents) and official/government matters (average around 10% of respondents). By way of example, Figure 11 presents the purpose of calls made / received from private providers in Uganda.

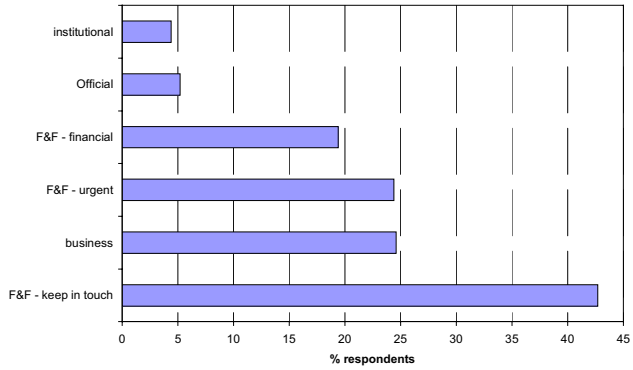

Figure 11 Purpose of calls (private providers, Uganda)

In Uganda, the pattern of purpose of calls is similar between men and women. The only indicator where a significant difference is registered is on the use of private providers for business calls, which are less popular with women.

Whilst there is not a great deal of variation by gender, the data from Ghana reveals something of gender roles. For example, men are more likely to use the phone to communicate with friends (64% of male users, compared with only 54% of women users), to make business and work related calls (45% compared with 33%), and to make calls relating to religious affairs, although this is still only a relatively minor use (7% compared with 2%). On the other hand, a greater proportion of women make family calls relating to financial matters (66% of female users, compared with 53% of male users).

Within the 'friends and family' grouping, the importance of calls related to financial matters is worth highlighting. In all three countries, the telephone was used substantially to arrange the transfer of money between family members, particularly from urban to rural areas, and further research would be useful, from a development policy point of view, in identifying whether this has a significant impact on capital flows or incomes in newly-telephoned areas. The facilitation of remittances was also cited by potential users as one of the significant values of telecoms availability.

4.4.10 Distance and direction of calls

TYPE OF CALLS MADE	Botswana (fixed phones)	Ghana (fixed & mobile)	Uganda (teleshops & booths)
local calls	45%	12%	27%*
national calls	26%	81%	72%**
international calls	1%	7%	1%
calls to mobile phones	28%	<1%	n/a

* calls within district; the local / national distinction is not relevant to mobile users.
** sum of calls to/from other districts and Kampala.

It is difficult to compare these data between countries because of the variation in the use of mobile telephones and different distinctions between local and national (trunk) calls. However, it is worth noting the high proportion of national calls made in all cases, reflecting the importance attached by respondents to maintaining contact with urban relatives. Equally, it is notable that very few international calls are made in spite of high numbers of respondents

having relatives abroad. The high cost of international calls presumably deters significant outgoing international traffic, but teleshop operators in Ghana also reported discontinuing international services after experiencing problems with billing.

Users that live in No Access Areas, and so travel to make use of telephone services, are – as would be expected – much more likely to make rather than receive calls. There is no reason, however, to assume that such callers would be less likely to receive calls than those in served areas if service were available to them locally, and this suggests that significant additional call revenue would be derived from traffic terminating in currently unserved areas once service becomes available.

4.4.11 Duration of calls

The average length of calls was relatively consistent across the three country studies. Average length of call also appears, from the evidence, to be relatively standard, i.e. not closely correlated with other variables identified in the research.

AVERAGE LENGTH OF CALLS (Outgoing)	Botswana	Ghana (fixed & mobile)	Uganda (booths and teleshops)	Average
under 3 minutes	45%	14%	62%	39%
3 to 10 minutes	50%	73%	34%	52%
over 10 minutes	6%	13%	3%	9%

For most groups assessed in the survey, the length of outgoing calls was shorter than that of calls received. This is probably to be expected, given the high proportion of calls exchanged between the surveyed (more rural) areas and major cities (where urban friends and relatives may have higher disposable incomes). The ability to receive calls at public access points, was highly valued by respondents, indicating that a significant proportion of calls may be made simply in order to arrange for a response call to be received.

This behaviour is most evident in the practice known as '**beeping'** in Uganda (and by a variety of different names in other African countries). 'Beeping' is the practice of dialling another user's phone number and letting it ring but hanging up before the call is answered, with the aim of prompting that person – for example, a more prosperous relative – to call back. Overall, 38% of the total sample regularly beep, using public access points. 32% of the total sample beep from private providers, and 15% from booths, reflecting the overall preference for teleshops as a public point of access. The popularity of beeping is reflected in the "success rate" - the proportion of beeps returned to customers using both booths and telephone shops is similar, at 40%. The proportion of successful beeps made from personal mobile phones is slightly higher at 45%, but these people call back only 34% of people who beep them, confirming that people in rural and low – income areas are less willing to pay for a call. 'Beeping' is particularly prevalent in Uganda because it requires 'caller ID' facilities which are available, effectively as standard, on the GSM phones which dominate that national market.

To the extent that beeping makes it easier for those without phones to get in touch with friends and family who can then call them back, beeping is likely to increase call volumes. Operators in Uganda therefore stand to benefit from the practice and could usefully promote it in their advertising material to encourage greater phone use. They could also seek to offer

incentives for teleshop managers to allow beeping from their premises: without some form of revenue-sharing, it is likely to represent a business loss to the teleshop proprietor.

4.5 Drivers and barriers – telephones

4.5.1 Telephones – drivers and barriers to use

Respondents to the survey were asked a series of questions designed to identify drivers and barriers to use of telephony, i.e. the positive factors encouraging them to make use of telephony and the negative factors which discourage them from doing so. Some of these factors relate to telephony in general (including private lines) but most are concerned with drivers and barriers to use of public access facilities.

Phones are considered by many to offer a quick, cheap and convenient form of communications that avoids the costs and risks associated with travel. In addition, knowledge of how and when to use phones are important drivers of use, with the belief that a person knows how to use a phone having the most influential effect on intention.

Among the most important drivers to use of telephony (fixed and mobile) cited in the three countries were:

- improved communications with friends and family abroad;
- ability to seek financial support from family members;
- speed and ease of communications.

As noted above, maintaining contact with friends and family was, in all three countries, by far the most commonly cited purpose for using telephony – a factor relevant to family finances (remittances) as well as social cohesion. A number of factors are likely to make telephony particularly valuable in this context in rural Africa, including:

- the high proportion of households with family members living in major cities or abroad (or, in some countries, working away from home) (see figures in 'Demographic Characteristics' section above);
- the high level of stated reliance on letters as the main means of communication (in a context where many postal services are unreliable and subject to lengthy delays, and where many individuals are non-literate);
- the immediacy and reassurance of telephone contact (especially on financial matters).

In this light, telephony seems a highly desirable substitute for letter correspondence and a major driver of telephony use even for low-income households. However, respondents made very little use of international telephony, presumably because the very much higher cost of international calls made this an unviable option for them.

4.5.2 Public access facilities – barriers to use

Four main types of barrier to use were cited by respondents concerning public access facilities:

- the quality of the user environment (notably privacy and queuing);
- the quality of attendant service
- the quality of network service and call completion

- price and methods of payment.

Respondents also cited fear of the loss or theft of mobile phones as a barrier to acquiring private mobile service.

Quality of the user environment

The first set of barriers to the use of public access facilities concerned the quality of the public access environment – i.e. the extent to which telephone conversations could be held in private, and the ease of use of facilities (in particular, the length of queues).

Privacy was a major barrier cited by users of public access facilities in all three countries. A high proportion of public access users were unhappy about having to conduct family and other business in the presence of others, including teleshop proprietors.

By their very nature, public access facilities provide limited privacy. Some teleshops may find it possible to reconfigure their premises in such a way as to maximize privacy. Although it is not certain that respondents are willing to pay for increased privacy for all calls, it is likely that there are certain calls – for example on financial or medical matters – that they would be unlikely to make at all if they could only do so, in effect, in public. Investment in reconfiguring premises is therefore likely to be recouped in due course.

Another important factor cited by respondents as a barrier to use was queuing. The popularity of public access facilities may have exceeded operators' expectations – this would be suggested by the high proportion of adults making use of telephony – leading to queues sufficiently long to deter inessential calls. Provision of additional lines/booths at popular locations would therefore probably be justified by additional call revenue.

Availability at non-standard hours (and in the event of an emergency) was another factor influencing respondents in favour of particular public access facilities (usually teleshops).

Quality of attendant service

Another factor influencing the quality of the user environment was the quality of service provided by intermediaries such as booth/teleshop attendants.

This could be either negative or positive. Attendants who were perceived to abuse users, for example by overcharging or by refusing to allow incoming calls, were seen as barriers to use. On the other hand, attendants who offered significant user support, explained tariffs and charges, permitted incoming calls or otherwise responded to customer needs were regarded positively by users and clearly encouraged greater use of the facilities.

There may be significant differences in the quality of environment between the two main forms of public access facility: for example, teleshops may offer more privacy or more attendant support than booths (which are often unattended and may be on the public street). In Uganda, this was certainly a factor leading to a consumer preference for teleshop access. Respondents in Botswana also commented that booths were often poorly maintained or out of service, again probably because they are not attended. They, too, were more positive in general towards teleshops than booths, at least where reliability and attendant service were concerned.

Quality of service

Quality of service factors were also cited as significant barriers to use of telephony by respondents to the survey.

Network quality problems underpinned many of the quality of service issues cited, for both fixed and mobile service. 'Frequent network breakdown' was the most frequently cited barrier to use of mobile telephony in Botswana.

The risk of being cut-off in mid-conversation was cited by respondents in all three countries as a significant disadvantage of telephony (though alternative communication methods do not offer any better interactivity). This problem may be partly due to uncertainty about charging – i.e. to prepaid cards running out of call units during a call – but poor network quality is clearly also an important factor, especially on mobile networks and in rural areas. In Botswana, it appeared to be more of a problem with the fixed network; in Uganda, more of an issue with the mobile network, especially in marginal service areas.

Price and methods of payment

A fourth series of barriers to use concerned price and methods of payment. This is partly concerned with the perceived high price of calls (particularly in Uganda), and partly with the ability of individual users to manage the cost of use.

Different respondents might have conflicting views of the same service in this respect. A substantial proportion of booth users in Botswana identified 'cheapness' as a driver to booth use, while a smaller but still significant proportion felt that the cost of booth usage was a barrier to use.

An additional barrier concerning prices in Uganda was the high cost of placing a call to another network (known as an off-net call) compared with that of placing a call within the same network (an on-net call). This was widely perceived as 'unfair' (a deterrent in itself) and as adding to the uncertainty associated with telephone use. Similarly, in Botswana, high tariffs for calling from fixed to mobile lines (approximately 2.5 times fixed to fixed tariffs) probably help to explain the lower than expected proportion of calls made from fixed to mobile phones.

Regarding choice of payment at booths, the survey showed a preference for coins over phone cards. In Botswana, however, a distinction is made between scratch cards (an account for use through any point of access) and phone cards (which can only be used in booths) – of these two, the scratch card is preferred. In Uganda, where customers can use the booth attendant's card (see below), there is similar use of coins and cards. Users saw advantages and disadvantages in both means of payment. The lower security costs associated with cardphones mean that they have often been favoured by telecommunications operators; however, one operator in Uganda has focused recently on the provision of coinphone facilities in response to user preferences.

Users in Uganda strongly appreciated the ability to buy their own telephone cards and resented the insistence of some teleshop proprietors that users should use their (the proprietors') cards (on which a mark-up of up to 50% was levied). At present, about 60% of users reported using attendants' cards, only 15% cards which they had purchased themselves.

A related, but opposite, barrier reported in more than one country was the unavailability of low-denomination cards, i.e. cards that were affordable without high capital outlay. In Botswana, even though respondents were required to pay a significant mark-up (also as high as 50%) for the use of an attendant's calling card, they preferred this to investing in a higher value card of their own for future use – the main stated reason for this being that the available denominations were too large.

4.6 Email and Internet

4.6.1 Patterns of use

In contrast to the widespread regular use of telephones, the research revealed very low levels of email and internet (browsing) use in all three countries, even in areas of high service coverage.

Regular Use of E-mail and Internet (browsing) % (whole sample)

	Botswana	Ghana	Uganda	Average
E-mail	5%	12%	9%	8%
Internet (browsing)		8%	6%	6%

On average across the three countries, less than 10% of respondents claimed to use email services or browse the internet on a regular basis. There is some inter-country variation around this average, with Ghana being above average in usage, Uganda being at around the average and Botswana being below average. (The figures for Uganda here are likely to be affected positively by the inclusion of a section of the capital city in the survey areas, and negatively by the lower availability of internet outside the capital resulting from the preponderance of GSM access.)

The actual numbers of email and internet users within individual sub-samples are too small to permit much analysis of internet use by sub-sample. However, a number of factors are evident across all three countries.

Of those few using email and internet, about 50% used it once or twice a month while about 30% used it daily.

The principal **point of access** in all study countries was an internet café, followed by the workplace; workplace access was highest in Botswana (41%), reflecting the relative strength of the economy.

It is evident that, as for phone calls, by far the most popular **purpose** of email communication is social, keeping in touch with friends and family (Figure 12). The internet is not the same, with the most popular sites relating to education and business; Figure 13 shows example results from Ghana.

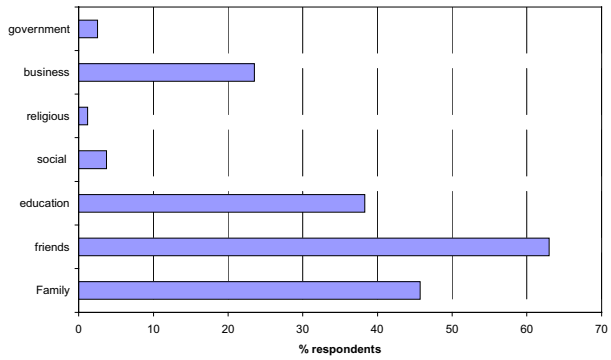

Figure 12 Purpose of emails (Ghana)

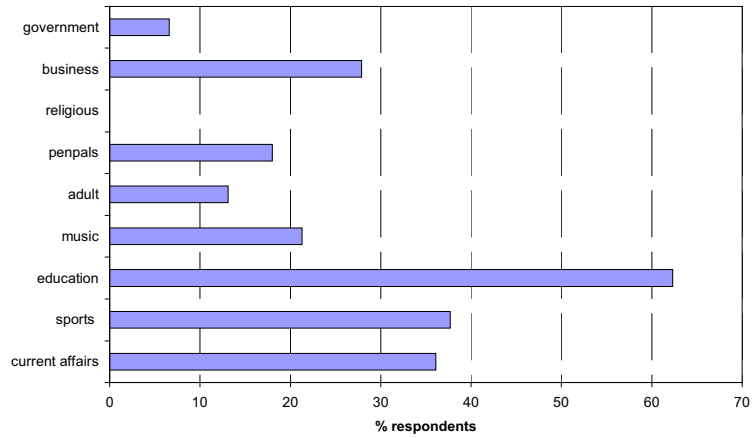

Figure 13 Types of web sites browsed (Ghana)

Whilst internet cafes remain the most common **means of accessing** the internet, there are a variety of alternatives, including a small number of home users.

Level of education was, not surprisingly, a major factor influencing propensity to use email and internet in all three countries. Those with secondary and/or post-secondary education were far likely to use internet than other educational tiers (83% of users in Botswana).

4.6.2 Barriers and drivers – email and internet

Educational content – and the belief that internet access could boost educational achievement – were also significant factors cited by actual internet users as drivers for internet use, alongside contributions to business effectiveness.

The high cost of internet access was cited as a major barrier to internet use in all countries. This high cost is caused by two factors: a) the high per minute charge for access which is based on the per minute charge for a phone call (where dial-up connections are used); and b) the slow speed of internet access, especially for browsing, which is due to restricted international bandwidth availability. It should be noted that slow browsing speeds also act as constraints on email use by public access (i.e. cyber-cafe) users who mostly use web-based email accounts.

The survey does not provide sufficient evidence to analyse potential use of internet at different cost levels (assuming cost to be a multiple of price and speed), but market analysis along these lines would be very beneficial to telcos seeking to stimulate internet use.

Two other major drivers/barriers to internet use were cited by respondents:

- knowledge of how to use services was a significant driver for those with the necessary skills but a substantial barrier to most users for whom the computer-based internet required a considerably greater paradigm shift than access to telephony;
- power cuts were a significant barrier, in particular raising overall costs of internet use and deterring file downloads.

Poor availability of internet cafes outside the capital city was also a barrier in Botswana, but it was evident that some internet cafes had closed because of lack of demand.

An interesting finding with respect to internet browsing is that respondents did not appear to consider the lack of local content to be a barrier. Most respondents said they used the internet to keep abreast of current affairs and to pursue business and educational opportunities – they did not make a significant distinction between "local" or "non-local" internet sites they browsed.

At first sight, this appears to contradict the widespread development agency emphasis on "local" content in order to promote the use of internet in developing countries. However, it could equally reflect the fact that absence of local content restricts browsing to those sections of the community who are interested in paying for non-local content. Again, further research into patterns of internet use would help telcos and development agencies more effectively to identify strategies for internet market development.

The expressed intention to use email or internet was weak in all countries and groups, including current users but particularly among those with low educational attainment and those with low general ICT awareness, i.e. the groups least likely to be familiar with these services.

5 Implications of Findings

5.1 Potential change in use in the future

The sections above focus on actual use of ICTs in the survey areas as reported by respondents. One of the advantages of the TORA methodology used for research analysis, however, is that it allows estimation of intended future use as compared with current use. This section sets out some of the conclusions that can be drawn from the research concerning respondents' intentions regarding ICT use in future.

Given that respondents' attitudes generally correlate well with their intention to use services, the strength of intent can be taken to be a reliable predictor of future behaviour if the behaviour context remains constant. The following figures present a graphical representation of the potential increase (or decrease) in use of services and access points for each country (sample as a whole, and then no access / rural areas in particular). Projected use is based on the number of respondents expressing a positive intention (expressed as a percentage of the

total sample), and the potential change is calculated by subtracting the percentage of respondents currently using the service.

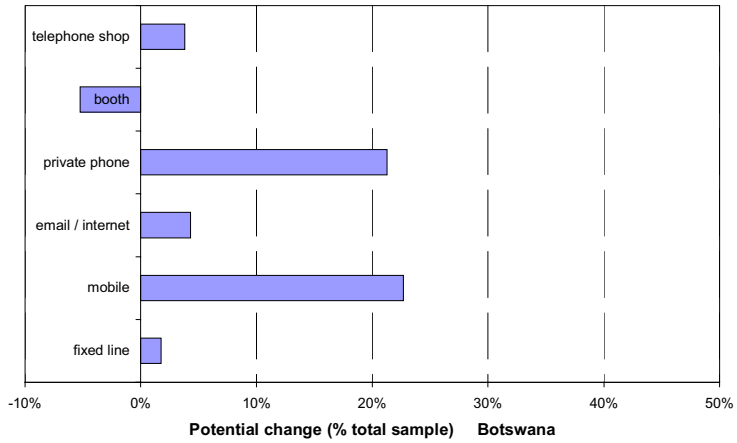

Figure 14 Potential change in use – Botswana (whole sample)

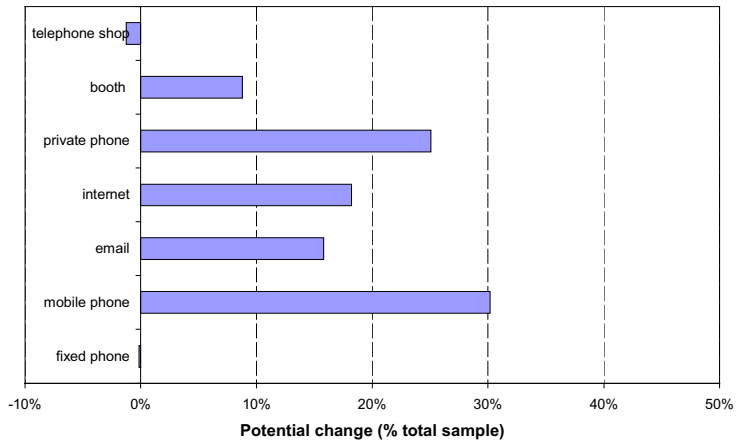

Figure 15 Potential change in use – Ghana (whole sample)

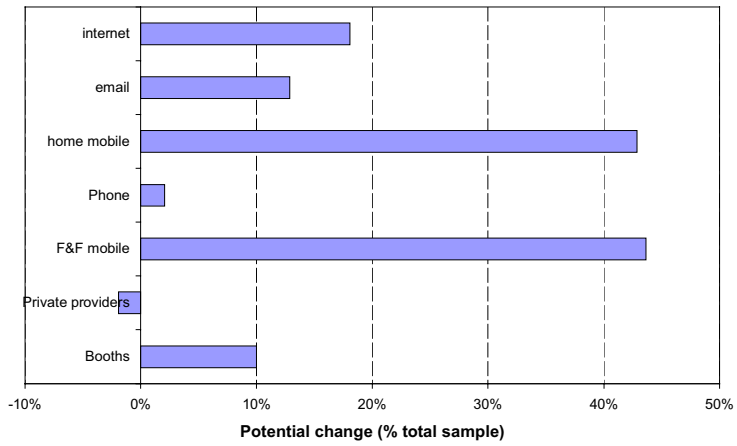

Figure 16 Potential change in use – Uganda (whole sample)

A trend that is consistent across all countries is the potential growth in use of **mobile phones**. Figures from Botswana and Ghana indicate that whilst intention to use fixed line phones is roughly in line with current use, intention to use mobile phones is 20 – 30% higher than current use. In Uganda, the intention to use phones (in general) is again roughly equal to current use, but the intention to use personal mobile phones is over 40% higher than current use. This desire to use mobile phones is also evident in the intended choice of access points in all three countries; whilst potential changes in use of booths and telephone shops is modest, intention to use private phones (mobile, by implication) is 20 – 40% higher than current use.

With regard to **public access points**, figures indicate that the trend in Ghana and Uganda is away from telephone shops, in preference of booths. This is in contrast to Botswana, where the trend appears to be in favour of telephone shops, at the expense of booths (note that negative attitudes for booths were strongly held, notably that they are often out of service).

When compared with the sample as a whole, those in no access and rural areas generally show a greater difference between intention and current use across the range of phones and points of access.

It is noteworthy that interest in the **internet** is higher than in email, even though current email use is higher - 9% email and 6% internet in Uganda, 12% email and 8% internet in Ghana, 5% in Botswana (combined).

Potential for increase in the use of services was found to be most common amongst certain social groups:

- those currently not using the corresponding ICTs;
- those with no or little formal education (in Ghana and Uganda, but not Botswana);
- those residing in No Access Areas,
- and those residing in Rural Areas.

The TORA analysis indicates that where a strong correlation exists between current and future intended use, respondents are using ICT services as much as they intend to use them on the basis of their current understanding of what can be provided by them; this tends to be true of groups with experience of services:

- those with higher levels of education
- those aged between 25 and 40.

For these respondents, therefore, additional usage is most likely to be stimulated by significant changes in the relative cost (or value) of services as a proportion of income, or by substantial new service offerings which are not currently anticipated. (This finding should, however, be set alongside the finding that as many as 80% of respondents considered themselves ‘regular’ users of telephony, a much higher figure than anticipated by telcos and regulators before network expansion. Together, the two factors suggest that network extension into areas that are still unserved may generate more revenue than anticipated, while multiplication of existing facilities in already served areas may have less effect on revenue generation.)

This evidence as a whole again suggests that the revenue return on further investment in No Access and Rural Areas could be higher than has previously been anticipated by governments and telecommunications businesses. It would be advantageous for both to undertake additional economic demand studies to investigate what proportion of increased intended use in the future might actually result in effective demand, given the respondents’ income and spending patterns.

5.2 Influencing the use of phones and public access points in rural/marginal areas

The ability to identify the barriers or drivers influencing different sectors of the society will permit the development of more specifically targeted promotional strategies and messages. The effective promotion of ICT services will need not only to challenge existing cognitive barriers but to also reinforce those outcome beliefs that are currently acting as drivers; these differ between those living within or beyond current service coverage.

This section presents a summary of the issues that the research indicates will need to be addressed in order to stimulate demand for services in remote rural areas. Beliefs currently acting as drivers can be reinforced, and where barriers are evident, steps need to be taken to address concerns.

5.2.1 Botswana:

Promotion of **fixed line phones** will need to reinforce beliefs regarding:
- Enhanced social communication
- Increased receipt of support from family (monetary)
- Convenience
- Reliability
- Ease of use

However, the promotional strategies will have to address current concerns regarding reliability, quality of line and their possible abuse.

Regarding **mobile phones** their promotion in the more marginal areas needs to emphasise the following advantages:
- Usefulness at times of emergency
- Convenience
- Ease of use
- Access to text messaging facility
- Coverage
- Portability

The barriers to be confronted are related to the issues of theft, network reliability, initial set-up cost, and the fragility of the handsets.

The promotion of **public booths** will need to reinforce the belief that:
- The booth is the cheapest form of public access

However, the concern regarding booths 'capturing' coins needs to addressed.

The advantages of using a **'telephone shop'** that should be promoted are:
- Reliability
- Transparency (costs)
- Accessibility

The main barriers regarding telephone shops relate to the issues of 'queuing' and 'privacy'.

5.2.2 Ghana

The promotion of **fixed line phones** in Ghana should strengthen beliefs regarding:
- Enhanced communication with friends and family (abroad)
- Access to information
- Reduced travel risks
- Improved economic activity
- Improved security

The main problems that should also be addressed are related to 'reliability' and 'automated instructions'.

The current perceived advantages of **mobile phone** use are:
- Cheap to use
- Access to text messaging and reduce costs

The promotion of **public phone booth** use in Ghana needs to reinforce beliefs regarding:
- Booths being the cheapest form of public access
- Accessibility (day or night)

Promoting the use of **telephone shops** in Ghana will depend on changing the persisting negative opinion that:
- Strangers will not receive good attention

5.2.3 Uganda

The use of **phones** in Uganda generally refers to the **mobile network** (even though delivered through public access facilities). In the case of promoting their future use the following positive perceptions should be reinforced:
- Reduced cost and risk of travel
- Ease of use
- Ability to communicate anywhere quickly
- Increased receipt of support from family (monetary)
- Improved economic activity

However, the barriers regarding phone use in the rural areas are very influential and will need challenging, particularly the negative expectations regarding:
- Reliability
- Expense (calling across networks)
- Poor network coverage

'Beeping' is a particular issue in Uganda especially with the poor. Beeping is used to solicit return calls. However, one of the influential cognitive barriers to mobile phone use is that the cost of calls is now such that people will not respond to the 'beeps'.

Phone booths in Uganda are often run by small businesses so they also have an attendant associated with their use that is distinct to the booths observed in Botswana and Ghana. For the rural Ugandan, the influential positive expectation that should be strengthened is:
- Transparency (re cost)

The barriers the promotional messages have to overcome relate to attendants:
- Overcharging

- Cheating

In contrast the positive expectations regarding the use of **telephone shops** that should be reinforced are:

- Reliability
- Helpful service (friendly)
- Convenience

6 Recommendations

6.1 General recommendations

6.1.1 Market research

The study reported in this document is one of the very first initiatives to survey the actual use of telephony and other telecommunications-related services in low-income communities in Africa, and so to provide direct, researched evidence for the level and nature of telephony demand in such communities.

This ought to be surprising. Implementation of universal access strategies is one of the key priorities for both ministries of communications and telecoms regulatory authorities in Africa, and may well include targeted subsidisation of access in areas believed to be commercially unprofitable. Telecoms networks are increasingly believed to have substantial value in promoting social development and economic prosperity. Telecommunications businesses – incumbent fixed network operators, fixed and mobile market entrants, and Internet Service Providers – all seek to implement business plans based on the provision of services that will prove commercially profitable (and so meet the requirements – the demand – of individuals and communities, many of which have previously been unserved).

The effectiveness of any universal access strategy, any universal access fund or any commercial network expansion programme will depend on its initiators' understanding of the market to be served. This study reaffirms anecdotal evidence that both regulators and telecommunications businesses have historically underestimated the level of demand for telephone usage in low-income communities. **The first recommendation from the study is, therefore, that regulators and telecommunications businesses should undertake much more substantial market research into the demand for telephony in previously unserved communities before finalising the details of universal access strategies, the level of universal funding available or the implementation of local and national network expansion programmes.**

Research of the kind conducted for this study – i.e. analysis of actual and intended usage by individuals in newly-served areas or unserved areas adjacent to those with service – seems to be effective in identifying both levels of usage that can be anticipated in newly-served areas and factors that will assist in maximising the level of demand/usage and so of revenue. **It is recommended that regulators and telecommunications businesses consider using methodology similar to that in this study to undertake this market research.**

6.1.2 Universal service strategies

Subject to this recommendation that market research should precede the implementation of both universal access strategies and network expansion programmes, all stakeholders in the ICT sector in African countries would be well-advised to note the first major finding of the study, that between 75% and 80% of respondents in researched areas use telephony on a 'regular' basis (use within three months), and that the proportion of those living in unserved areas adjacent to areas with service who make such use of telephony is only marginally lower (at 70% to 75%). These figures appear robust across the different telecoms environments and income levels experienced in the three study countries. **It implies that regulators and telecommunications businesses should assume that the substantial majority of adults in most African countries will wish to make significant ('regular') use of telephony, i.e. to use a telephone once a month or more, and should build their maximum subsidy projections and network revenue return projections on this level of usage.**

6.2 Recommendations to policymakers and regulators

6.2.1 Universal Access strategies

The first main recommendation for policymakers and regulators concerns the level of demand for telephony identified by the study. If the finding that some 70% of adults are likely to make 'regular' use of telephony applies generally, then this – and related factors concerning the type of use (duration and distance of call, etc.) will have substantial effects on the revenue that may be derived by telecommunications operators extending networks and providing services in previously unserved areas.

The high proportion of potential users making use of telephony suggests that revenue returns on network expansion may tend to be underestimated by telecoms operators, who may therefore consider some potentially revenue-positive network expansion opportunities to be commercially unviable. Regulators may, in these circumstances, be inclined to make subsidies available from universal access funds where these are not really required (so diverting funds from areas where subsidies are more necessary).

Regulators should build on the findings in this research and on local market research to establish clear guidelines for determining the relatively small number of areas in which access cannot be provided on a commercial basis and the arrangements for universal access funding required to make network operators prepared to provide access in those areas.

Market research of the kind recommended above may help to address this issue. **In addition, regulators may wish to consider more widespread use of reverse-auction or least-subsidy auctions procedures for the allocation of universal access funds/subsidies.** In these procedures – substantially used in Latin America – regulators or universal access fund managers identify a maximum subsidy they are prepared to pay and invite tenders from telecoms operators that are prepared to provide the service required for a lower subsidy. The advantage of this process in these circumstances is that tendering companies will submit competitive tenders based on more realistic assessments of market demand, leading to a lower overall subsidy (or perhaps no subsidy at all) being required.

6.2.2 Means of access

The evidence from Uganda, in particular, shows a distinct preference among rural users for teleshop access rather than for access through network operators' booths, though the reasons for this are not entirely clear. In any event, regulators should bear in mind end-user's preferences in determining the means of access to be supported through universal access funding.

From the public access end-user's point of view, competition between different suppliers of public access (i.e. teleshops or a mixture of booths and teleshops) is more relevant than competition between networks (though it may be exhibited through competition between different network operators' public access facilities). Regulators should at least encourage and preferably require operators to permit private entrepreneurs to establish public access facilities (teleshops) in competition with network operators' facilities (booths), particularly in areas where network expansion is being funded through universal access funds.

6.2.3 Overall telecommunications competition

The research findings indicate that there is some correlation between usage and the degree to which competitive networks are available to consumers, i.e. that usage levels tend to be higher in 'High Access Areas' than in 'Medium' or 'Low Access Areas'. This finding may be affected, however, by the fact that competition between network operators is more likely to be found in more prosperous areas. Nevertheless, **telecoms regulators should consider whether the present level of competition between operators is adding maximum customer value, and review competition arrangements when current licence exclusivity periods come to an end. Widespread consultation and research should form part of this process.**

As noted above, from the public access end-user's point of view, competition between different suppliers of public access (i.e. teleshops or a mixture of booths and teleshops) is more relevant than competition between networks. Anecdotal evidence suggests that franchised and entrepreneurial teleshops do compete to offer different services, levels of service and prices to consumers, but more research is needed on the impact this has in individual markets. **Regulators should undertake research to identify ways that will maximise the benefits to users of competition between different public access suppliers.**

In any event, the price of services from teleshops will be higher than that from booths if teleshops are required to pay operators the same price per unit of usage as private retail customers. **Regulators should at least enable and perhaps require network operators to offer bulk discounts (wholesale prices) to teleshop proprietors, provided that the cost savings to them are passed on in lower prices to end-users.**

Differential charging for termination of traffic on other operators' networks is anti-competitive if it cannot be justified on cost grounds, and introduces price uncertainty which deters use of the network. This practice was cited as a barrier to use by respondents in Uganda. **Regulators should require full cost-justification for any differentials in tariffs for termination of traffic on competitors' networks.**

With respect to intention to use services in the future, there is a clear preference for mobile communications, especially in rural areas and those with no service. **Regulators should ensure this is reflected in the design of universal access strategies.**

6.2.4 User-oriented regulation

The research has identified a number of important drivers of telecommunications usage and, in particular, barriers deterring usage, particularly by inexperienced users and potential users with lower educational attainment levels.

The main responsibility for stimulating usage rests with the telecommunications operators which stand to gain additional revenue as a result. Most recommendations on this theme are therefore included in the following section, which is concerned with recommendations to telecommunications businesses. However, if the extension of telephony use is believed to be desirable on social, economic and developmental grounds, then it is appropriate for policymakers and regulators to intervene where necessary to promote its use by consumers.

Regulators should therefore monitor the performance of telecommunications network businesses in responding to user requirements and stimulating demand, and intervene to encourage them to do so if they are failing in this respect. An example in which regulatory intervention along these lines might be appropriate would be requiring operators to make available low-denomination phonecards.

Poor quality of service is described by survey respondents across all sectors as a barrier to use, and improvements to quality of service would increase the value of the network to end users and add potential revenue. **Regulators should require network operators to undertake regular quality of service monitoring, publish the results in a form that can be easily understood by the public at large, and establish benchmarks and targets for future improvements in quality of service. These should include high targets (e.g. 90%) for payphone functionality.**

This should improve customers' information on the relative quality of service provided by different operators and put pressure on operators to maintain a high quality of service. Care will need to be taken to select comparable areas for each operator to ensure that any one operator is not unfairly disadvantaged.

Further tariff regulation may be required at the level of the booth or teleshop if there is evidence that network operators or teleshop proprietors are exploiting monopoly or near-monopoly market positions to overcharge customers. For example, regulators may wish to consider putting a cap on the mark-up which teleshop proprietors may charge end-users for use of their services, or of phonecards supplied by them.

Regulators might also explore with operators the introduction of a wider range of tariff packages including those designed to increase ownership for people with low incomes. In other countries there exist special price packages for people who make only limited use of phones, and these are sometimes subsidised by the government or a universal access fund.

6.2.5 Email and Internet

The research revealed very low levels of current email and internet use among respondents and low levels of intention to use these services in future.

This issue is particularly noteworthy in Uganda, whose predominant GSM networks are poorly suited to internet delivery. However, low levels of internet use and intention to use are equally evident in much more prosperous Botswana, where higher income levels and

proximity to South Africa's high levels of internet usage might have been expected to lead to stronger internet participation.

The efficacy and value of promoting internet access in low-income communities is still contested (see 'Recommendations to Development Agencies' below), but the increasing consensus today is that the availability of access provides important opportunities for individual and community prosperity as well as opportunities for advancing mainstream development goals. The levels of internet take-up identified by the research, however, are concentrated in more highly educated (and therefore probably more wealthy) groups and probably too low to have any substantial impact on general community prosperity.

Policymakers and regulators can devise different frameworks for encouraging investment and for regulating ICTs to suit different policy objectives. Investment shortages and the dynamics of ICT markets suggest that a balance of priorities needs to be struck in each national case. Policymakers and regulators should assess the relative merits of prioritising network expansion for telephony, on the one hand, and internet facilities on the other. This assessment should include analysis of the impact of different ICTs (including telephony and internet) on rural livelihoods and economic behaviour, based on detailed studies of their real impact in real communities. Few such studies have been undertaken or published to date.

A number of measures can be taken by policymakers and regulators if they decide actively to promote internet access and usage. These should focus on overcoming the barriers identified by users in the study, in particular the high cost and unreliability of internet connectivity and the lack of computer use skills within the community as a whole. **Measures to promote internet use might therefore include:**

- **requiring telecommunications operators to include public internet access within their network expansion programmes;**
- **cost reduction through:**
  - **requiring operators to offer ISPs cost-related wholesale tariffs that allow them to determine user prices or offer toll-free tariffs;**
  - **enabling national internet traffic exchange through Internet Exchange Points (IXPs) and liberalising international internet access through VSATs (where this is not permitted);**
- **increased reliability through:**
  - **introduction of quality of service monitoring and benchmarks;**
- **and including basic experience of computer use, where possible, in educational programmes.**

The unreliability or unavailability of power supply is another factor inhibiting internet use. **Telecommunications regulators should discuss with power regulators ways in which joint initiatives could be undertaken to synergise power and telecommunications sectors, including the possibility of coordinated network development initiatives.**

6.3 Recommendations to telephone operating companies

6.3.1 Network expansion

Evidence from all three countries shows that a very high proportion of people living in areas without direct access, but adjacent to areas with access, are prepared to travel significant distances in order to use telephony. This evidence is particularly strong in Botswana, where a

significant number of people living outside mobile service areas own mobile handsets which they can only use when away from home (either on business or by travelling to a point where they can be used).

This evidence suggests that there is substantial unmet demand for telephony throughout low-income communities in Africa, and that individual citizens are prepared to spend significantly on telecommunications use, especially where it substitutes for travel. **Telecommunications operators should revise their network expansion strategies based on higher assumptions about the revenue that can be derived from low-income markets** (supporting this through the market research recommended above).

6.3.2 Overall market stimulation

The evidence shows that there is substantial demand for the use of telephony in rural Africa, including areas that are currently unserved. However, the barriers to use identified by the survey show that the level of use is still inhibited by inexperience and by uncertainty about costs among consumers, particularly those with lower levels of education.

Experience in other countries shows that it takes a considerable period of time for communities to become fully acculturated to telephony. Telecommunications companies can accelerate this process by stimulating understanding of telephony, its advantages and costs.

This suggests **that an active campaign or road show to promote the advantages of phones, explain how they work and how much they cost would increase use, particularly in rural areas and amongst people with low education, low ICT awareness and those that have never used phones.** Such a campaign could be undertaken by individual telcos or in partnership by the industry as a whole, perhaps in conjunction with the national regulatory body. It should make full use of radio and other popular media. Price and other relevant information should also be widely advertised, especially at the point of use.

6.3.3 Market stimulation: maximising handset sales

The evidence from all three countries shows that a significant number of users make several calls each day from public access facilities. In most countries, this level of usage would lead users to acquire personal ownership of telephone facilities – i.e. to procurement of fixed line access or a personal mobile handset. Those who own access, whether residential users or small businesses, will tend to use telephony more than those who rely on public access.

It may be useful for network operators to conduct research into types of tariff packages that could be used to encourage high users of public access facilities to upgrade to personal phone ownership. **Research could be carried out on the types of low user and other packages targeted at people with low incomes that are available in other countries, and pilot projects conducted in particular areas.**

6.3.4 Improvements in network performance

Quality of service, particularly call failure, was cited as a barrier to use by respondents in all three countries. This may be a particular problem in rural areas, where networks may be less resilient, and sustained efforts to improve network quality, particularly to ensure that calls are completed to users' satisfaction, may be rewarded with greater consumer confidence and higher traffic volumes.

Recommendations concerning ways to improve quality of service were included in the 'Recommendations to policymakers and regulators' section above. **Telecommunications network operators should pre-empt regulatory action to raise quality of service standards by initiating their own reviews of quality of service and taking action to improve network quality and call completion rates through additional infrastructure, adoption of alternative power source technologies and other means.** The extent to which queuing and poor network quality currently deter usage suggests that this problem will only grow as societies become more acculturated to telephony, and that investment in higher quality of service will be recouped in additional call revenue. It will also enhance the competitive position of network operators ahead of the development of more open competition.

6.3.5 Marketing strategies – telephony

The research findings on propensity to use telephony and on intention to use telephony have significant value for telecommunications operating companies interested in maximising service usage and so revenue.

These findings are concerned only with domestic and small business use of telephony, not with its use by large businesses. However, **the findings suggest that telecommunications operators would benefit from clearly thought-out strategies to segment the 'small user' market and address different groups within that market in different ways.**

The research shows, for example, that those groups which make most use of telephony at present, in particular those that are highly educated, show most correlation between current levels of use and intended use of telephony. This suggests that these groups are fully accustomed to telephony and are currently making near-optimal use of the service from their personal point of view, i.e. they are using the telephone as and when they want to. Their current usage of the network is unlikely to increase unless and until network expansion extends the number of people with whom they choose to communicate by telephone and/or new services are made available that are attractive to them.

The research also shows, however, that other groups are currently making relatively less use of telephony than other groups or than their expressed intention for the future. Those aged over 40 and those with low educational qualification levels are two categories in point. **Telecommunications businesses should undertake research to identify the barriers to use of telephony among groups currently making little or no use of it, and devise strategies to overcome these barriers and so increase traffic revenues.**

In developing these segmented approaches to stimulating the market, telcos should pay particular attention to the 'purposes of use' and to the 'barriers and drivers' regarding use of public access facilities identified in the research.

6.3.6 Marketing strategies – newly-served areas

The research indicates that there is likely to be strong take-up of telephone usage in newly-served areas once network expansion takes place. As many as 70% to 80% of adults seem likely to make some 'regular' use of telephony. **Telecommunications operators should learn from earlier experience and offer a higher level of public accession provision in newly-served areas to meet higher anticipated levels of demand.**

The research also indicates that there are significant barriers to use for inexperienced users, who may be slow in becoming accustomed to use and may require support from intermediaries. Potential users with lower educational levels are particularly likely to welcome support of this kind. Telecommunications operators will presumably promote the availability of services in newly-served areas through a variety of marketing tools. **Operators should also take the opportunity to encourage less confident potential users by more generic advertising, for example using local radio and other communications media to explain the potential uses, costs and ways of using telephony both at the time of network expansion and subsequently.** (A similar strategy – promoting wider understanding of how to use mobile handsets by social groups currently using relatively few handset features – was deployed by one of the UK mobile operating companies during 2003.)

6.3.7 Public access facilities

A majority of users in most African countries are likely for the foreseeable future to obtain telephony access primarily through public access facilities – whether booths managed by telecommunications operating companies or privately-managed teleshops. The research indicates that the quality of the calling environment offered by these facilities has a significant impact on levels and patterns of use. For example:

- users, particularly inexperienced users, welcome support services provided by attendants;
- users welcome the opportunity to receive as well as make calls at public access points;
- users are deterred by lack of privacy, queuing and other constraints on ease of access and uncertain pricing arrangements.

Different telecommunications operators have adopted different strategies towards public access facilities – some focusing on providing operator-managed booths, others on franchising private entrepreneurs to provide teleshop access. **Telecoms businesses should carefully examine user preferences in determining the most appropriate form of access provision and establishing facilities which most effectively meet consumer needs (and so maximise usage).**

Two factors affecting this decision may be a) the security and other maintenance costs of operator-managed booths (in comparison with entrepreneur-managed teleshops) and b) maintenance of network quality (as faults are likely to be reported more quickly by teleshops whose managers are immediately dependent on them for their livelihoods). On balance, it is likely that booths will be more expensive for telcos to maintain and have lower returns per line than franchise arrangements; and outsourcing may therefore be an opportunity to increase revenue and improve quality at the same time.

Telecoms businesses should compare the economic characteristics of operator-managed booths and franchised teleshops in determining their network expansion strategies. In addition, whether or not they use a franchising approach, telecoms operators may find it financially beneficial to provide support to teleshop proprietors, for example through bulk discounts (provided these are passed on to end-users), business skills training, training in basic maintenance, etc.

The research provides considerable evidence concerning user preferences in the use of public access facilities, in particular the high value placed by users on privacy, ease of use, pricing options and support services offered by attendants. **Telecommunications businesses should play close attention to these user preferences in designing and deploying operator-**

managed booths. For example, evidence on the extent of queuing to use services should be used to determine the number of booths made available, while booths themselves should be designed, for example with better soundproofing, to enable users to hold conversations about sensitive matters in relative privacy. **In newly-served areas, where most users will be unaccustomed to telephony, it may be appropriate for booths to be supported by attendants who can assist new users and report faults as they arise, ensuring rapid maintenance.**

Many respondents in the survey described pricing levels and methods of charging as barriers to telephone use. As well as perceived high prices in general, particular concerns included:

- the unavailability of low-denomination telephone cards;
- the high mark-up charged by attendants for use of cards they made available (and the unwillingness of some attendants to sell cards);
- differential charging rates for calls to other networks;
- and any factors making the cost less transparent or predictable to the end-user.

Telecommunications operators should address the price-related barriers to telephony use by, *inter alia*, making lower-denomination calling cards available, diversifying card distribution, advertising official tariffs widely on national and community radio stations, and addressing other complaints identified through ongoing market research. They should also consider user preferences between coin and card phone methods of purchasing access.

Users in more than one country noted the value to them of the opportunity to receive as well as make calls through public access facilities. This opportunity is advantageous to end-users (who save money) and telecoms operators (who generate reverse traffic) but disadvantageous to teleshop proprietors (who lose their profit margin on outgoing calls). For similar reasons, where caller ID is incorporated in network technology, **operators should encourage 'beeping', which adds value to end-users and increases network utilisation and revenue**.

Some teleshop owners may charge a fee for receipt of calls, but others refuse to accept incoming calls. **Telecoms operators should consider ways of sharing the revenue from calls terminating in teleshops with teleshop proprietors in order to encourage them to permit 'beeping' and similar arrangements for calls to be received at public access facilities.**

Finally, it may be possible for the revenue streams of both telcos and teleshop proprietors to be increased by providing additional facilities to end-users. The extensive use of telephony for facilitating financial transfers between family members has been noted. **Telecommunications operators should consider whether they can facilitate wire transfers and other remittances either directly or through teleshop proprietors.**

6.3.8 Marketing strategies – Internet

The research undertaken for this study found very low levels of both email and browsing use of the internet in the communities, even in the group of capital city residents specifically included to identify use of the internet in Uganda (where the prevalence of GSM networks outside the capital inhibits internet access).

This suggests that, at present, telecommunications businesses should consider internet services as a niche market, primarily used by businesses and higher value customers, rather

than a mass market like (the research indicates) basic voice telephony usage. If they wish to develop revenues from internet provision, **telecommunications businesses should work with Internet Service Providers to expand the potential market for internet by advertising and promoting internet use (particularly email), reducing the cost of internet usage (by, for example, entering into IXP agreements and providing wholesale rates to ISPs enabling them to offer low cost internet access), increasing reliability (for example, through alternative power supplies) and providing training for potential internet users.**

6.4 Recommendations to development agencies

6.4.1 General / telephony

Development agencies have only recently begun to play a prominent role in promoting ICTs for development, including both telephony and internet alongside more traditional ICTs such as (community) radio. Agencies have not been primarily interested in investment in infrastructure, but in establishing a policy and regulatory framework that will facilitate private sector investment leading to more extensive (and, ultimately, universal) access provision. Agencies' main concerns are with the capacity of ICTs to empower poor communities and address problems of poverty, and with their role in supporting the achievement of mainstream development programmes, including the Millenium Development Goals.

The evidence of this research supports the conclusion that development agencies need not be directly involved in investment. Levels of demand for basic voice telephony usage uncovered in the research are significantly higher than have historically been anticipated by either national policymakers or telecommunications businesses, and should be sufficient to attract external investors. Relatively little comparable research has been undertaken, however, and this conclusion is at present largely supported elsewhere by anecdotal evidence. **Development agencies could usefully aim to expand the knowledge base concerning demand for telephony in low-income communities through supporting targeted research and dissemination of research findings.** Research should be conducted quickly and, wherever possible, through local research institutions.

The evidence also tends to support the conclusion that the quality of policy and regulatory frameworks has a major impact on the ability of telecommunications businesses to roll-out networks that meet consumer demand. GSM technology in Uganda has proved particularly effective at delivering basic voice telephony, including through public access facilities. There is an increasing volume of experience in the implementation of competitive markets and the establishment of universal access strategies in Africa, including strategies to maximise the commercial viability of telecommunications services. **Development agencies should facilitate the sharing of experience between African policymakers and regulators in the commercial restructuring of telecommunications and provision of service to hitherto unserved areas, in order to maximise the value of regionally relevant expertise.**

The evidence shows that the take up of telephony is widespread, but still skewed towards the more highly educated and wealthier sections of the population. This pattern of take up is normal for the adoption of new technologies. All sections of the community, however, have identified clear advantages in the use by them of basic voice telephony, in particular maintenance of family contact and the transfer of funds between family members (remittances). (The research conducted for this study does not provide a

sufficient base for assessing small business experience.) The scale implies that take up does not need to be promoted for its own sake, but there are barriers to take up by more disadvantaged groups that need to be overcome which are primarily to do with pricing and confidence in telephony use.

These findings suggest that **rather than funding further pilot projects and telecentre initiatives, development agencies should focus attention on ensuring maximum geographic network availability and promoting replicable and scalable access methodologies (such as entrepreneurial teleshops) which will have a commercial incentive to stimulate usage within communities. In the (fewer than anticipated) areas in which network expansion is not apparently commercially viable, development agencies could support the establishment of universal access schemes requiring short-term funding such as reverse-auction arrangements.**

6.4.2 Email and Internet issues

The limited evidence available from internet users does not indicate that any significant value is being attached to the availability of email and internet access by the majority of telephone users. Internet, at least, does not seem to be adopted with the same enthusiasm as telephony by new users in low-income communities, either because they lack the requisite skills or because they do not judge it to have similar value to them.

This raises a number of issues concerning the ongoing debate between the relative merits of investment in basic services (such as voice telephony, which is accessible to all) and advanced services (such as internet, which are more accessible to more educated groups and to those with higher income).

The evidence of this survey is too specific to enable any conclusions to be drawn concerning this debate, but it does tend to reaffirm the importance of development agencies (both national agencies and international donors) reviewing carefully:

a) the relative merits of prioritising investment in basic services and in internet; and
b) the need for internet access initiatives to be supported by supplementary activities such as training initiatives, particularly if they are to be of value to the poorer and less educated parts of the community.

Development agencies are recommended to undertake more extensive research on the impact of different ICTs (particularly telephony and internet) on rural livelihoods and other measures of development, in order to facilitate more effective prioritisation of ICT and development policies.

6.4.3 Infrastructure coordination

A significant barrier to both telephony and internet use identified in the research was the inadequacy of power supplies, causing network and service failures in fixed, mobile and internet service alike.

Power and telecommunications infrastructures are both inadequate in most African countries, in that many areas remained uncovered by infrastructure and that the infrastructure available has a high failure rate. There are strong synergies between the infrastructure roll-out requirements of the two sectors, and **development agencies might usefully examine the**

economics of supporting joint infrastructure investment approaches bringing power and communications services together to hitherto unserved communities.

6.5 Recommendations for future research

This study was intended to assess the ways in which low-income communities in Africa made use of telephony, and the implications of these usage patterns for universal access strategy development and telco network and service planning. It has generated a substantial amount of evidence about users' behaviour and attitudes, some of which is reported in this document but most of which is either reported in supporting analyses or contained in the data sets which are available for consultation and further analysis by national stakeholders.

The methodology used for this study offers significant value for both policymakers/regulators and telecommunications businesses. **Both regulators and businesses in other African countries are recommended to consider undertaking similar market research studies to support network expansion strategies and identify issues of particular importance in national telecoms markets.**

The sampling strategy for this research was designed to cover 'typical' rural and low-income communities. However, there is growing interest in rural development funds designed to promote the roll out of services to unprofitable areas. **Such initiatives would benefit from extending this type of research methodology into the most remote rural communities**.

In addition to general market behaviour studies such as this, the research has identified a number of other, more detailed, areas in which analysis would be of value both in the original study countries and elsewhere. **Regulators and businesses are recommended to consider undertaking research studies of, for example:**

- **consumer responsiveness to different tariff strategies;**
- **individual customer expenditure patterns on communications;**
- **the impact of telephony access on postal services and on remittance transfers;**
- **and training requirements to promote effective use of email and internet.**

Finally, this study does not extend into the impact of telephony access on mainstream development objectives including livelihoods and poverty reduction. The value of ICT access in alleviating poverty, and the extent to which it affects the balance of advantage between poorer and wealthier social segments, remain controversial issues in the development community, and little empirical research has been undertaken on this at a national, regional or community level. **Development agencies are recommended to undertake or support research into the impact of telephony on the livelihoods and economic opportunities of poorer social groups in African developing countries.**

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Appendix 1

Example questionnaire

Appendix 2

Example of Targeted Output Document (for Development Agencies)